SONY CVC-2100

MODEL

SERVICE MANUAL

Section 1
General Description

This manual provides service information for our VHS Cassette Recorder.
The manual describes the principles and adjustments of mechanical and electrical operation for this model.
Service procedures given herein cover only field maintenance services.
Adjustments which require high-level instruments, jigs and techniques are excluded, since they should be performed at the factory.
Due to design modifications, the servicing procedures and data given in this manual are subject to possible change without prior notice.

Important Safety Precaution

Prior to shipment from the factory, our products are strictly inspected to conform with the recognized product safety and electrical codes of the countries in which they are to be sold. However, in order to maintain such compliance, it is equally important to implement the following precautions when a set is being serviced.

• Precautions during Servicing

1. Parts identified by the ⚠ symbol are critical for safety.
   Replace only with parts number specified.
2. In addition to safety, other parts and assemblies are specified for conformance with such regulations as those applying to spurious radiation. These must also be replaced only with specified replacements.
   Examples: RF converters, RF cables, noise blocking capacitors, noise blocking filters, etc.
3. Use specified internal wiring. Note especially:
   1) Wires covered with PVC tubing
   2) Double insulated wires
   3) High voltage leads
4. Use specified insulating materials for hazardous live parts. Note especially:
   1) Insulation Tape
   2) PVC tubing
   3) Spacers
   4) Insulation sheets for transistors
5. When replacing AC primary side components (transformers, power cords, etc.), wrap ends of wires securely about the terminals before soldering.
6. Observe that wires do not contact heat producing parts (heatsinks, oxide metal film resistors, fusible resistors, etc.).
7. Check that replaced wires do not contact sharp edged or pointed parts.
8. When a power cord has been replaced, check that 10—15 kg of force in any direction will not loosen it.
9. Also check areas surrounding repaired locations.
10. Use care that foreign objects (screws, solder droplets, etc.) do not remain inside the set.
11. Crimp type wire connector
    In such cases as when replacing the power transformer in sets where the connections between the power cord and power transformer primary lead wires are performed using crimp type connectors, if replacing the connectors is unavoidable, in order to prevent safety hazards, perform carefully and precisely according to the following steps.
    Replacement procedure
    1) Remove the old connector by cutting the wires at a point close to the connector.
       Important: Do not re-use a connector (discard it).
    2) Strip about 15 mm of the insulation from the ends of the wires. If the wires are stranded, twist the strands to avoid frayed conductors.
    3) Align the lengths of the wires to be connected. Insert the wires fully into the connector.
    4) Use the crimping tool to crimp the metal sleeve at the center position.
       Be sure to crimp fully to the complete closure of the tool.

• Safety Check after Servicing

1. Insulation resistance test

Confirm the specified insulation resistance or greater between power cord plug prongs and externally exposed parts of the set (RF terminals, video and audio output terminals, etc.).

2. Dielectric strength test

Confirm specified dielectric strength or greater between power cord plug prongs and exposed accessible parts of the set (RF terminals, antenna terminals, video and audio output terminals, etc.).

3. Clearance distance

When replacing primary circuit components, confirm specified clearance distance.

4. Leakage current test

Ultra-miniaturized "Chip" Parts

1. In place of conventional resistors and capacitors, this model uses miniature chips to perform these functions. Although these contribute substantially to miniaturization of the product, certain precautions are required in their handling and replacement.
   1) Chip parts are soldered directly to the copper pattern of the circuit board. Due to their small size, tweezers and other tools suitable for handling small objects are required.
   2) For soldering, use a thin, high insulation, soldering "pencil" in the 20 watt range (less than 30 watts is recommended). Perform soldering and unsoldering quickly (within 2 or 3 seconds) to avoid overheating.
   3) Removed chip parts cannot be re-used.
   4) Since ratings and values are not marked on the chip parts, use care to stock them in an orderly manner.

2. Unsoldering
   1) Use a suction type or similar desoldering tool to unsolder both ends of the chip part.
   2) Grasp chip part with tweezers and while carefully heating with the soldering pencil, remove part with a twisting motion.

3. Soldering
   1) Pre-solder the points of the pattern to which the chip part is to be mounted.
   2) Press the chip part against the circuit board and solder both ends.

4. Chip Parts Interchangeability
   In some cases, chip parts can be replaced with conventional parts (holes may be present to allow insertion of part leads).

DESCRIPTION OF CIRCUITS < Video Section >

1. PLAYBACK SYSTEM

1.1 Luminance Signal (Y signal)

A weak playback FM signal, which is input to the video head, is amplified by Q1 and Q2 and is input to pins (23) and (24). It is resonant at 5 MHz by VC1 and VC2 at this instance by which high frequency compensation is made. At the same time, compensation around 4.5 MHz is also made by the resonance circuit using L2, L3, C15 and C16 located at pins (20) and (21). Two head outputs are switched by the switching pulse which is input to in (18) and a continuous FM signal is output to pins (16) and (17). Chroma signal is removed while it is passed through the by-pass filter of C17 and luminance signal (Y signal) is solely input to pin (15). Y signal being output from pin (4) is compensated by DOC (Drop Out Compensator) circuit which is passed through 1H delay line and is input to pin (6) and is input to pin (1) of IC2.

< D.O.C. Circuit >

This circuit is provided to compensate remarkable drop outs. Y signal the detection level of which is determined through the limiter is added to the detection circuit. At the same time, Y signal which is passed from the switch circuit to 1H delay line (DL-1) is also added to the switch circuit. When a drop out is detected, the switch is changed over and drop out is compensated by filling the missing part by 1H advanced Y signal.

FM signal being input to pin (1) of IC2 is demodulated by the FM demodulator as shown in Fig. 1. Operations of this circuit are shown by waveforms in Fig. 2. Waveform (1) becomes waveform (2) since it is modulated in FM at playback mode. It becomes waveform 3 after being passed through the limiter and is input to the multiple vibrator. This multiple vibrator has such a characteristics that certain delay time is made available if self-running frequency is synchronized with Y signal. For this reason, it becomes waveform (4), (3) and (4) are input to the multiplier and waveform (5) is obtained. Y signal free from carrier is then obtained by passing this output through the low pass filter.

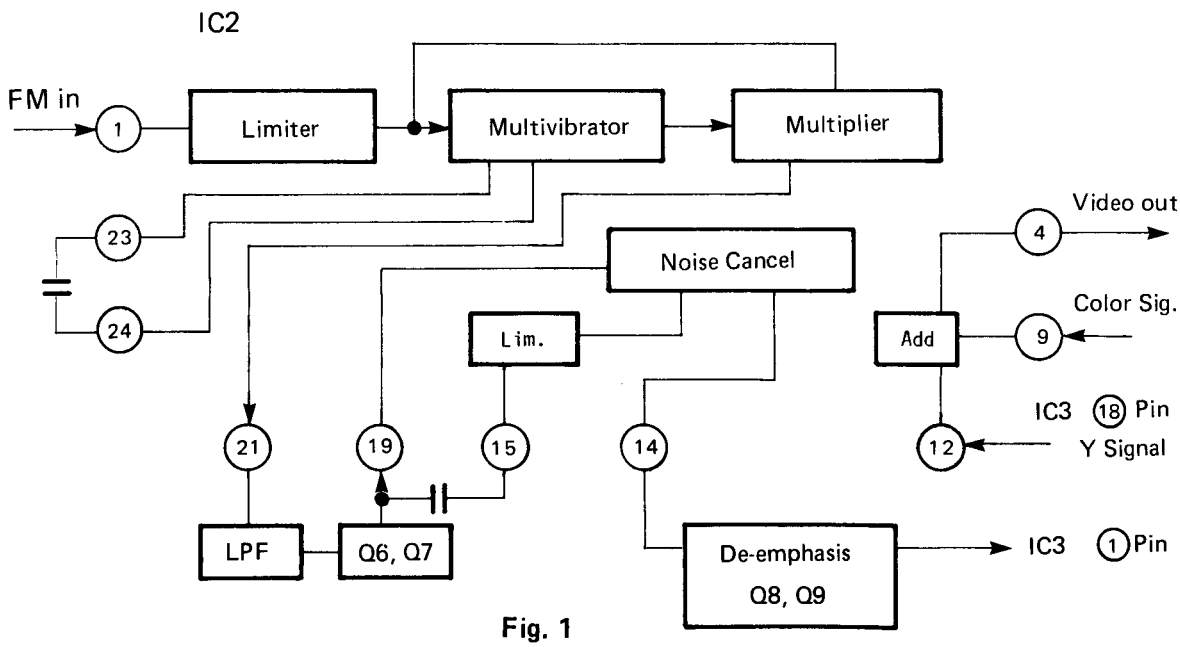


Fig. 1

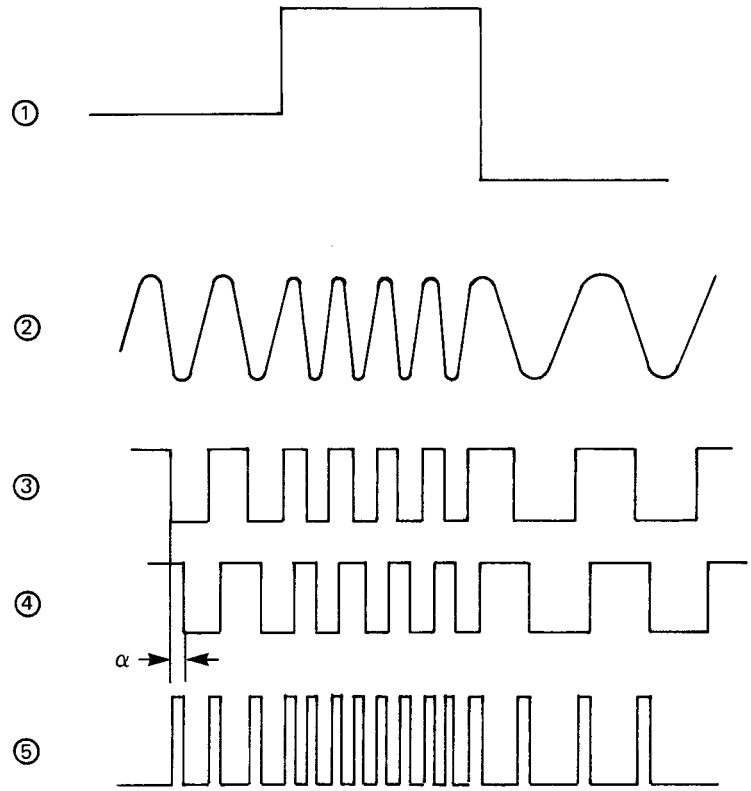


Fig. 2

Y signal being passed through the amplifier of Q6 and Q7 is input to pin (19) where it is noise canceled with the noise component from pin (15) is output from pin (14) and is passed through the de-emphasis circuit comprising of Q8 and Q9. Thus the frequency characteristics of Y signal is compensated. Subsequently, Y signal being input to pin (1) of IC3 is amplified and is output to pin (22).

Playback Y signal is passed from Q18 to T1 and Q20, and is input to pin (20) of IC3. Y signal being output from pin (18) passing through the clamp circuit is input to pin (12) of IC2, mixed with the color signal, is output to pin (4) and becomes to video output after being passed through Q14 and Q15.

Furthermore, it is input to RF converter after being passed through T4 and Q16.

1.2 Color Signal

Playback FM signal which is output from pins (16) and (17) of IC1, R21 and R22 is passed through the low pass filter comprising of L7, C28 and 30, is amplified by Q38 and is input to pin (18) of IC4. After being passed through ACC (Automatic Chroma Control) amplifier, 5.06 MHz signal which is input to pin (14) is added to frequency conversion circuit and 4.43 MHz color signal is thus obtained. This signal is output from pin (12) and is passed from Q33 to T2 and T3 filters thereby removing higher harmonics introduced at frequency conversion. Thus necessary color band only is obtained. Subsequently, it is amplified by Q37, is input to pin (10) of IC4, passed through the amplifier and is output to pin (9). This signal removes the crosstalk of color signal by means of DL-2 (2H comb filter). This system is called as PS (Phase Shift) color method.

< PS Color Method >

Playback color signal is converted in low frequency and is affected by the crosstalk from adjoining track due to the guard bandless recording. Therefore, it should be removed throughly. For this reason, the phase of color signal of CH2 video track is shifted every 90° under recording mode. And if the signal passed through 2H comb filter and another signal not passed through it are added at playback mode. The crosstalk is then canceled and the color signal is doubled. These are shown in Fig. 3.

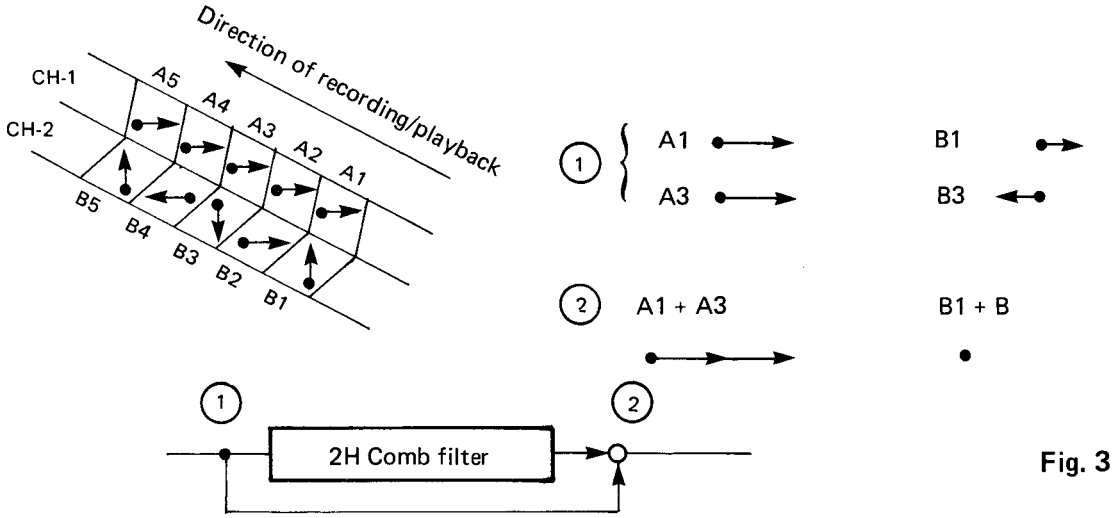


Fig. 3

The color signal which is input to pin⑥of IC4 is passed through the amplifier, is output to pin⑦, it's level is adjusted by VR13, it is input to pin⑨of IC9 and is mixed with Y signal. In case of B/W input where color noise appears on the screen when the color circuit is actuated, noise prevention measure is provided in such that Q35 is turned to ON/OFF by ACK output from IC6. As for ACC circuit operation, burst signal is taken out by the burst gate pulse that is input to pin④, this is subject to peak detection, ACC amplifier is controlled by this error voltage and color level is kept constant by maintaining the burst lavel constant. Thus a stable color signal is obtained.

The frequency of the color signal after playback is varied due to playback jitter and the like and therefore, stable color signal is not obtainable even if low frequency conversion color signal is restored to the original signal. Therefore, stable color singal is obtained by using AFC and APC circuits.

< AFC Circuit >

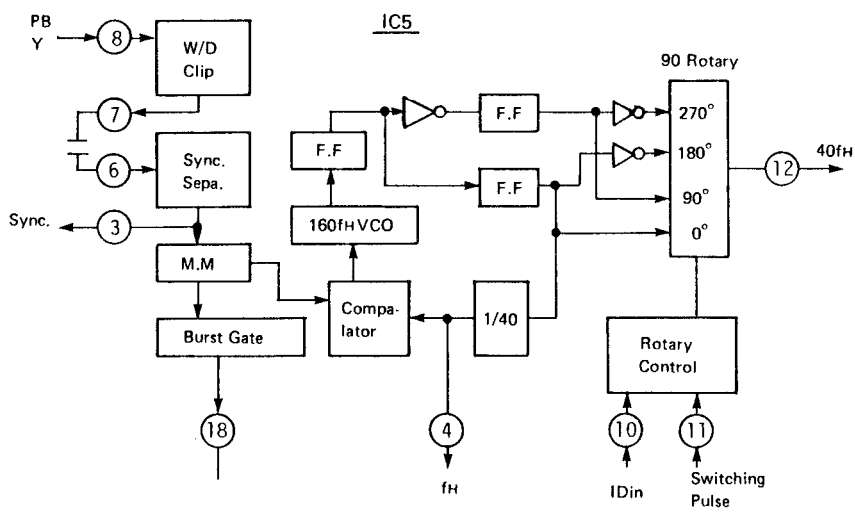


Fig. 4

Block diagram of AFC circuit is as shown in Fig. 4. First of all, playback Y signal is input pin⑧and Sync. is solely output from pin③by sync. separator. It is also input to the phase comparator and 160 fH VCD is controlled by its error voltage. Furthermore, 160 fH is divided into 40 fH each having 0°, 90°, 180° and 270° at the stage where it is counted down to 1/4, and these are output to pin ⑫. With PS color method as stated previously, CH2 is shifted in phase every 1H at recording and this is therefore restored to original at playback. Therefore, the phase should be shifted to reverse direction. This can be controlled by the input voltage of pin⑪.

As for the operation of this circuit, the frequency of playback color signal becomes higher when the frequency of playback H Sync. gets higher. Therefore, 16 fH which is synchronized with H Sync. becomes higher and 40 fH also gets higher. At the same time, 5.06 MHz carrier becomes higher since it is composed of 40 fH and the crystal oscillator.
Therefore, the difference between playback color signal and 5.06 MHz carrier varies no more and a stable color signal is made available.

< APC Circuit >

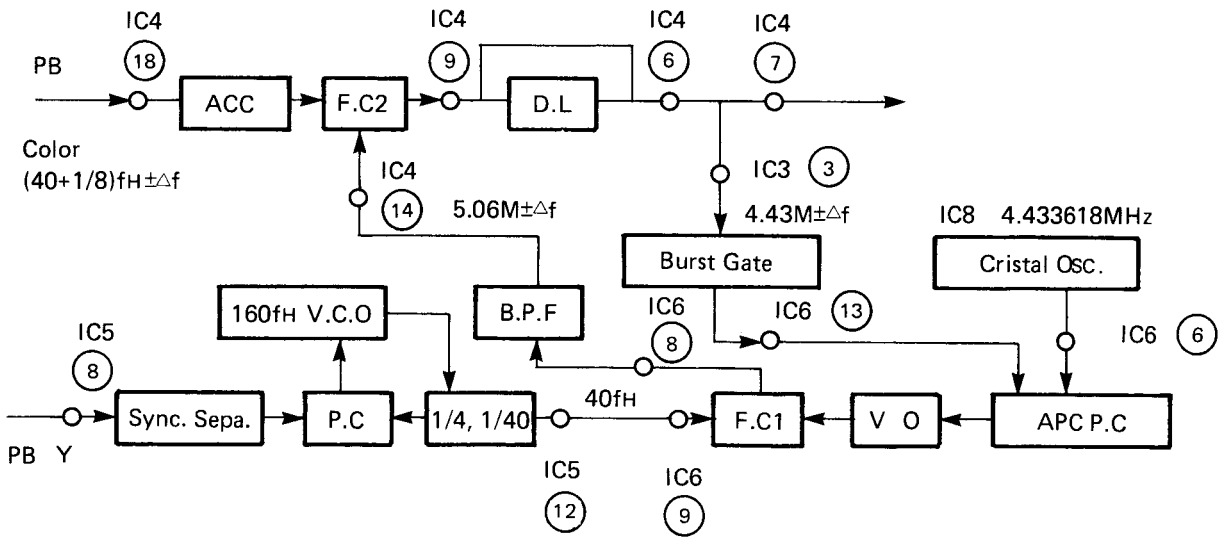
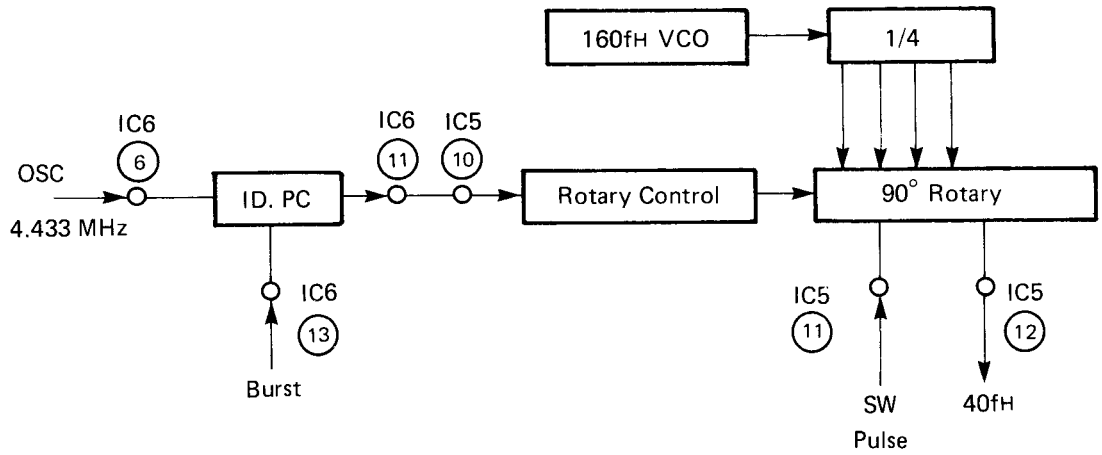


Fig. 5

Block diagram of APC circuit is shown in Fig. 5. First of all, playback color signal (including variation) is input to pin ⑱of IC4 and is restored to original color frequency by FC2. However, ±△f is frequency converted with regard to the carrier (5.06 MHz ∓△f) being synchronized with the burst signal (including variation of △f) and ±△f is eventually removed.

APC circuit is required since stable playback color signal can not be obtained by AFC circuit alone. Playback burst signal in input to pin ⑬of IC6 and phase comparison is executed with correct frequency that is input to pin⑥of IC6. The frequency of VXD is controlled by the error signal as generated above.
Therefore, 5.06 MHz which is synchronized with the burst is always input to pin⑭of IC4.

< ID Circuit >



In this circuit, ID pulse is generated when H Sync. is missing (burst input is not available also) due to drop out at playback, it is input to 40 fH PS control, phase is shifted by 90° for every pulse. Thus incorrect operation of the circuit is prevented.

< Dummy VD Circuit >

When the noise band approaches to V Sync. under still mode, V Sync. is attacked and TV picture is disordered. Dummy V signal is then added to the video signal all the time by the circuit comprising of Q10 ~ Q12, D2 and D3 so that V synchronizing is kept at stable status.

2. RECORDING SYSTEM

2.1 Luminance Signal

First of all, the video signal which is input to video is input to pin ③ of IC3. After it is passed through AGC amplifier, is output to pin ㉒, input to the emitter of Q23 (base grounded) and its color component is removed by the low pass filter comprising of L14 ~ 16, C56, 57 and 65. It is further passed through the equalizer (T1) that is provided for time adjustment of color and through Q20, and is input to pin ⑳ of IC3. The sink chip is secured by the clamp circuit so that the dynamic range of the output from pin ⑱ has reasonable margin. The output from pin ⑱ is passed through Q21, is input to pin ⑯ and high frequency is emphasized by the preemphasis circuit. Subsequently, the level is limited by means of white and dark clip so that excessive modulation may not be caused at FM modulation. Y signal which is modulated in FM is output from pin ⑫, passed through the high pass filter comprising of L17, 18, C77 and 78 thereby preventing possible beat which may be caused by mixing of color signal. It's level is adjusted by VR11, mixed with the color signal being converted in low frequency by the recording amplifier comprising of Q24 ~ Q30, amplified to the optimum level and the signal is added to the video head via rotary transformer.

2.2 Color Signal

The video signal which is output from pin (22) of IC3 is input to Q32. Luminance signal is still included at this status and therefore, it is passed through T3 (4.43 MHz band pass filter) while color signal is taken out solely and is input to pin (1) of IC4. It is frequency converted by 5.06 MHz carrier that is input to pin (14) and becomes to low frequency conversion color signal (626.953 KHz ± 500 KHz). The color signal which is output from pin (12) is input to pin (8) after higher harmonics is removed by low pass filter comprising of L22, C106 and 107. After being amplified, it is output from pin (7) and after level adjustment is made by VR12, it is further input to recording amplifier comprising Q24 ~ Q30.

< Low Frequency Conversion Color Signal >

The low frequency conversion color signal is generated in the process as shown in Fig. 6.

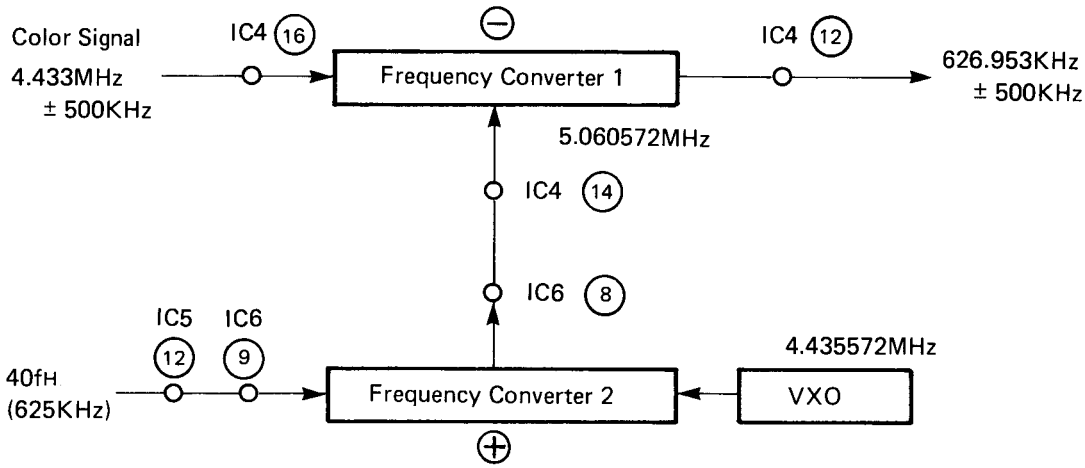


Fig. 6

In FC2, 40 fH and crystal oscillated VXO are added thereby generating 5.06 MHz.

In FC1, the input color signal and the said 5.06 MHz are subtracted thereby generating low frequency conversion color signal of 626.953 KHz.

1. DRUM SERVO CIRCUIT

1.1 Recording

1.1.1 Circuit for drum speed system

FG signal of 600 Hz which is generated by FG coil and the magnet being mounted on the drum motor is passed through pin ③ of CL-I of main PCB and is input to pin ② of IC 302.

It is sufficiently amplified by FG AMP and hysteresis AMP in IC 302 and is turned to a rectangular wave.

A saw-tooth wave is generated between rising of the said pulse and next rising, and the voltage corresponding to input pulse frequency of pin ⑧ is output from pin ⑪ in the sampling hold circuit.

This speed error voltage is mixed with phase error at pin ⑬ , taken out from output in ⑮ of MIX AMP, passed through pin ⑤ of CL-I and is used as the driving signal for motor driving IC which is mounted to the drum motor.

The rotational speed of the head drum can be adjusted by changing CR time constant of pin ⑨ of IC 302. If the speed is lowered by some reason, the drum servo acts to maintain the speed at constant in such that pulse frequency of pin ⑧ is lowered, speed error voltage being output from pin ⑪ is increased and drum driving voltage is also increased thereby increasing the rotational speed of the motor.

1.1.2 Circuit for drum phase system

(Refer to Timing Chart REC for Drum Phase System)

The drum PG pulse which is generated by two magnets N and S, and hall IC being mounted on the drum motor is passed through pin ① of CL-I and is input to pin ② of IC 301. These positive and negative PG pulses are amplified respectively and trigger the mono-multi. And its output is input to the flip-flop circuit, and RF SW pulse is generated at pin ⑤ of IC 301.

The time constant of pin ③ of IC 301 determines the change-over timing from CH 2 head to CH 1 head. The time constant of pin ④ determines the switching timing from CH 1 head to CH 2 head.

Furthermore, a trapezoidal wave is generated simultaneously from this RF SW signal (pin ⑦ of IC 301) and rear side slope of this trapezoidal wave is subject to sampling by V-Sync which is discussed later.

As for REF signal of drum phase system at recording, V-Sync which is separated from recording input video signal is used.

This V-Sync that the ringing is removed by Q307 is input to pin ⑬ of IC 301. It is counted down to 1/2 and becomes 25 Hz pulse, delayed by mono-multi of pin ⑪ and executes the sampling of the slope of above-mentioned trapezoidal wave.

The time constant of pin ⑪ determines RF SW pulse and the phase of V-Sync. In the meantime, the time constant of pin ⑩ determines the sampling time.

The sampling voltage is held for one frame duration in subsequent S/H circuit, output from pin ⑨ of IC 301 as the drum phase error and is mixed with the speed error at pin ⑬ of IC 302.

When the head phase is delayed with regard to V-Sync by some reason, the servo acts in such that the error voltage at pin ⑨ of IC 301 is increased and driving voltage for the drive motor is also increased and rotational phase is advanced.

Therefore, the head and V-Sync are in always constant phase relation at recording (REC TIMING). If this adjustment is disordered, a noise appears on the picture at playback mode.

1.2 Playback

1.2.1 Circuit for Drum Speed System

The drum speed servo under playback mode is same as that of recording. However, it is designed in such that the time constant of pin ⑨ of IC 302 is changed in order to keep relative speed between the head and the tape at constant under cue and review modes.

Under cue mode, the heads of CH 1 and CH 2 draw the locus as shown in Fig. A since the tape runs at five times normal speed to forward direction.

Therefore, relative speed between the head and the tape is reduced and synchronizing of the playback picture is disordered.

For this reason, VR 307 is adjusted for cue mode so that same relative speed as at normal running is obtained.

The locus under review mode is as shown in Fig. B in which case relative speed is increased and the playback picture is also disordered.

Accordingly, VR 306 is also adjusted for review mode so that same relative speed as at normal running is obtained. Q310, Q311 and Q312 are transistors for volume selection under review, cue and normal modes respectively and selection is made by the signal coming from the system controller.

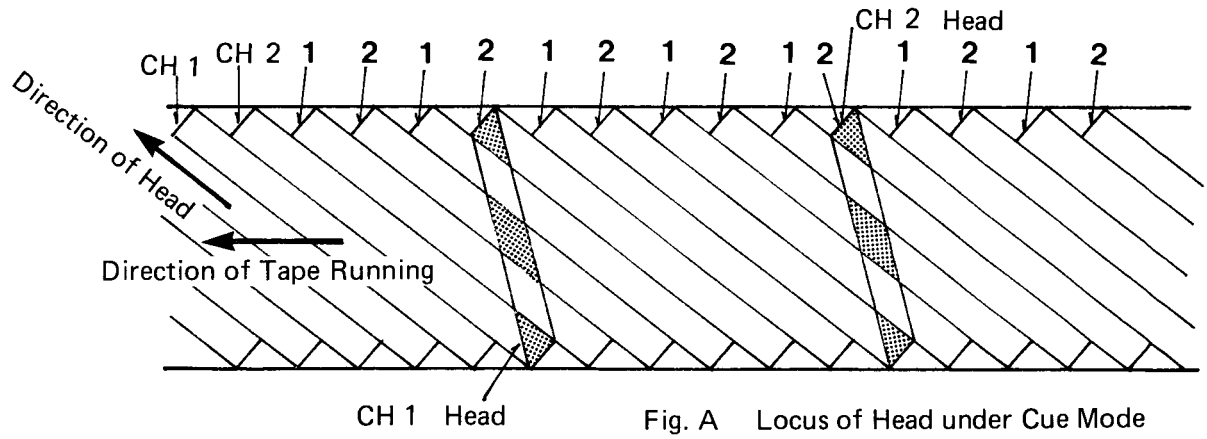


Fig. A Locus of Head under Cue Mode

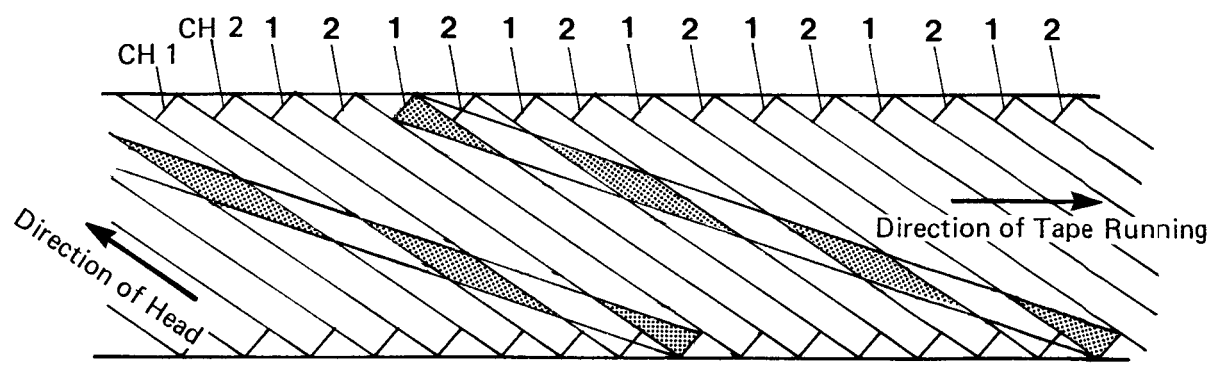


Fig. B Locus of Head under Review Mode

1.2.2 Circuit for Drum Phase System

(Refer to Timing Chart PB for Drum Phase System)

V-Sync signal of the video is used for the reference signal of drum phase servo under recording mode. However, at playback, 1/88672 divided frequency of crystal oscillation 4.433618 MHz which is generated by IC ⑧ is used. Namely, 50 Hz is input to pin ① of IC 301 as the reference signal (REF signal).

This REF signal is further counted down to 1/2 in IC to become 25 Hz and is used for sampling of the slope of a trapezoidal wave which is generated by drum PG pulse.

The phase error being output from pin ⑨ is mixed at pin ⑬ of IC 302, and same phase control of the drum motor as observed under recording mode is executed.

It is possible to switch the head 6.5H ahead by V-sync which is recorded on the tape while Funai REF tape is played back and volumes VR302 and VR303 for pins ③ and ④ are adjusted respectively. Compensation is made by VR304 for still mode since the time from head switching position it V-Sync is difference between CH 1 and CH 2 .

2. CAPSTAN SERVO CIRCUIT

2.1 Recording

2.1.1 Circuit for capstan speed system

FG signal of 250 Hz which is generated by the magnet and the coil being mounted on the capstan flywheel is input to pin ② of IC 303 through pin ① of CL-E.

This FG signal is amplified by FG amplifier and hysteresis amplifier in IC, and is turned to a rectangular wave. One saw-tooth wave is generated between rising of this pulse and next rising. An error voltage which is reversely proportional to the input frequency of pin ⑧ is output from pin ⑪ while the peak of the said waveform is sample held. It is mixed with the phase error at pin ⑤ of IC 304 to become the driving signal of IC 306.

When the capstan motor speed is lowered by some reason, the interval of FG pulse to be input to pin ⑧ of IC 303 is lengthened and therefore, the peak value of saw-tooth wave is increased and the voltage is increased too.

Driving voltage of pin ④ of IC 306 is then increased so that the motor is rotated fast.

2.1.2 Circuit for capstan phase system

(Refer to Timing Chart REC for Capstan Phase System)

The reference signal of capstan phase system under recording mode is V-Sync signal which is separated from recording input video signal and is input to pin ⑬ of IC301.

This 50 Hz V-Sync is counted down to 1/2 in IC, and 25Hz pulse is generated and a trapezoidal wave for the capstan servo is generated.

Furthermore, the duty of this 25Hz pulse thus generated by V-Sync is widened by the time constant of pin ⑰ , amplified by REC amplifier, is added to CTL head and is recorded.

As for the pulse used for sampling of the trapezoidal wave, FG pulse being output to pin ⑧ of IC 303 is counted down to 1/5 by IC 305 to become 50Hz and is input to pin ㉓ of IC 303.

This 50Hz pulse is further counted down to 1/2 in IC 303, determines the sampling time by mono-multi time constant of pin ㉔ and executes front slope sampling of the trapezoidal wave mentioned previously.

As for the capstan servo under recording mode, therefore, the pulse that is 1/10 counted down from 250Hz FG pulse synchronizes with the pulse 1/2 counted down from V-Sync, and the tape is run correctly. When the rotational phase of the capstan motor is delayed by some reason – FG pulse phase is behind V-Sync, phase error at pin ㉖ of IC 301 is increased and driving voltage of pin ④ of IC 306 is also increased and rotational phase of the motor is advanced.

2.2 Playback

2.2.1 Circuit for capstan speed system

The capstan speed servo under plyaback mode is operated exactly same as that of recording mode. However, five times normal tape speed is obtained by changing over the time constant of pin ⑨ of IC 303 under cue and review modes.

Under cue mode, Q318 and Q320 are turned to ON and adjustment is made so that VR 309 tape speed becomes five times.

Under review mode, Q320 is turned to OFF and R380 is connected to VR 309 in series where no adjustment is necessary.

2.2.2 Circuit for capstan phase system

(Refer to Timing Chart PB for Capstan Phase System)

The reference signal of capstan phase system servo under playback mode uses 50Hz signal that is 1/88672 divided frequency of crystal oscillation 4.433618MHz being generated by IC 8, and a trapezoidal wave necessary for the capstan servo is generated.

As for comparison signal, a weak CTL signal recorded on the tape is picked up by CTL head, input to pin ⑱ of IC 301 and is amplified by CTL amplifier.

Next stage mono-multi is triggered at plus side of this CTL signal and is delayed by approximately 1 field duration.

The time constant of pin ㉑ is adjusted since, at playback, the video head travels at the center of video track.

In the next mono-multi, the video head can be run at the center of the video track even by the tape recorded by other VTR while the time constant of pin ㉒ is varied by tracking mono-multi, namely tracking VR is varied.

CTL signal is delayed by approximately 1 frame by these two mono-multis, the sampling interval is determined by PG mono-multi of pin ㉔ and front slope of the trapezoidal wave which is generated from the reference signal is subject to the sampling.

When the phase of CTL is delayed by some reason, the phase error voltage of pin ㉖ is increased and driving voltage of pin ④ of IC 306 is also increased, capstan motor rotation is raised and the servo acts so as to advance the CTL phase.

3. CAPSTAN MOTOR DRIVING CIRCUIT

Capstan motor drive is controlled by the capstan servo error voltage which is input to pin ④ of IC 306.

Rotational direction of the motor is controlled by inputting the control signal from the system controller to pins ⑤ and ⑥ .

Operational mode of IC 306 is shown in Fig. C.

Operational Mode	IC 306	Input		Output		Remarks
	Pin ④ Input	Pin ⑤	Pin ⑥	Pin ②	Pin ⑩	
REC & PLAY	Approx. 2.5V	L	H	L	H	Normal turning
REC PAUSE	Approx. 5.5V	L	L	L	L	Stop
FORWARD SEARCH	Approx. 11V	L	H	L	H	Normal turning
REVERSE SEARCH	Approx. 11V	H	L	H	L	Reverse turning
FF	Approx. 14V	L	H	L	H	Normal turning
REW	Approx. 14V	H	L	H	L	Reverse turning
STILL	Approx. 14V	H	H	L	L	Brake, Stop
STILL NOISE CANCEL	Approx. 14V	H/L	H	L	H/L	Normal turning
STOP	Approx. 14V	L	L	L	L	Stop

Fig. C

When the control signals being input to pins ⑤ and ⑥ of IC 306 are H, H or L, L, the capstan motor is put into stop condition regardless of drive voltage being input to pin ④.
If the control signals to pins ⑤ and ⑥ are L and H respectively, the motor is turned normally and if they are H and L, it is turned reversely. The higher input to pin ④, the faster the motor speed at this instance.
Input to pin ⑥ is H under noise cancel mode. However, an electric current flows through the motor at the instance when the input the pin ⑤ becomes H – L and intermittent driving is done.

4. SPECIAL MODE OPERATION

4.1 Play pause (= still)

Following transistors are turned to ON under still mode:

a. Q328, Q327
After Q328 and Q327 are turned to ON, resistance R311 of pin ④ of IC 301 is connected with VR304 in parallel and time difference from RF SW of CH 1 and CH 2 to V-Sync is compensated under still mode.

b. Q323
After this transistor is turned to ON, C352 voltage is clamped to R404 voltage and after still mode is released, voltage variation of C352 is reduced and a stable playback picture can be obtained promptly.

c. Q325, Q324
The base control input of Q325 is FAST signal. This signal is remained at H even under still mode. This is because, although the capstan motor is intermittently driven at noise cancel operation, the signal is kept same as drive signal under FF mode at that instance.

Q324 has nothing to do with still mode, but is related to FF/REW operation which is discussed hereinafter.

4.2 REC PAUSE

Operations are same as those stated under play pause except that Q325 and Q324 are turned to OFF.

4.3 FF/REW

a. Q325
This transistor is turned to ON in order to obtain approximately 15V at output pin ⑦ of IC 304 of MIX amplifier. Driving voltage of pin ④ of IC 306 pin is increased and the motor is turned at high speed.

b. Q324, Q323
Under FF/REW mode, Q323 is turned to ON and the voltage of pin ⑤ of IC 304 is promptly brought to both ends voltage of R404 in order to keep the motor speed at constant.

4.4 Cue

a. Q313, Q320, Q318, Q319
The time constant of pin ⑨ of IC 303 is changed over to normal mode to obtain the capstan speed under cue mode.

b. Q311
The time constant of pin ⑨ of IC 302 is changed over to normal mode to obtain the drum speed under cue mode.

c. Q317
The drum phase error voltage which is output from pin ⑨ of IC 301 is set at zero in order to limit the drum servo under cue mode to the speed servo alone. (This is turned to ON also under review mode.)

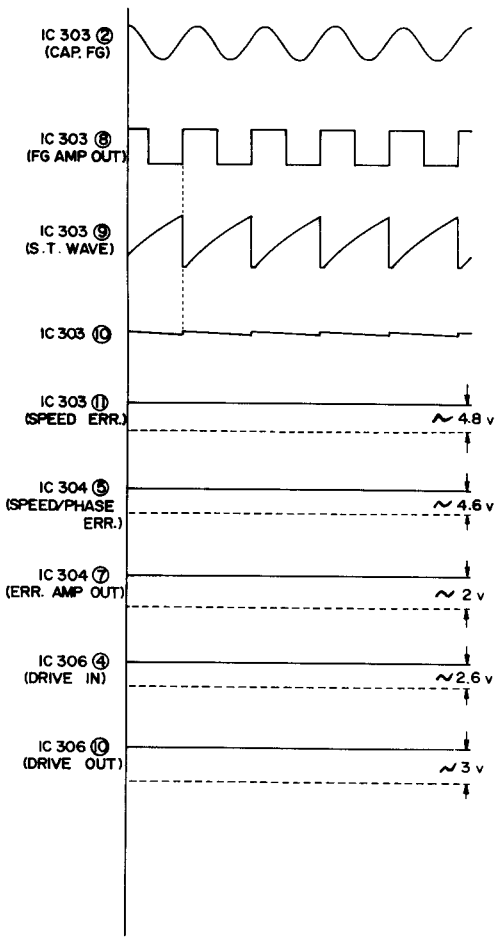
4.5 Review

a. Q318, Q319
The time constant of pin ⑨ of IC 303 is changed over to obtain the capstan speed under review mode.

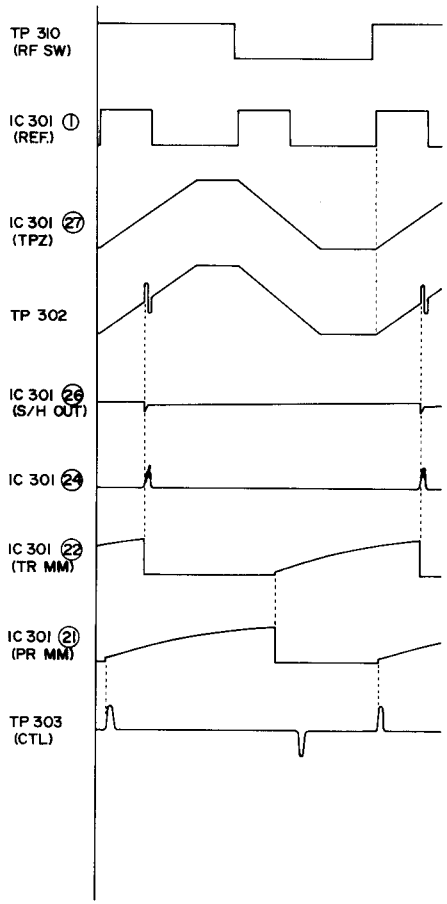
b. Q309, Q310
The time constant of pin ⑨ of IC 302 is changed over to obtain the drum speed under review mode.

Timing Chart (Capstan Servo)

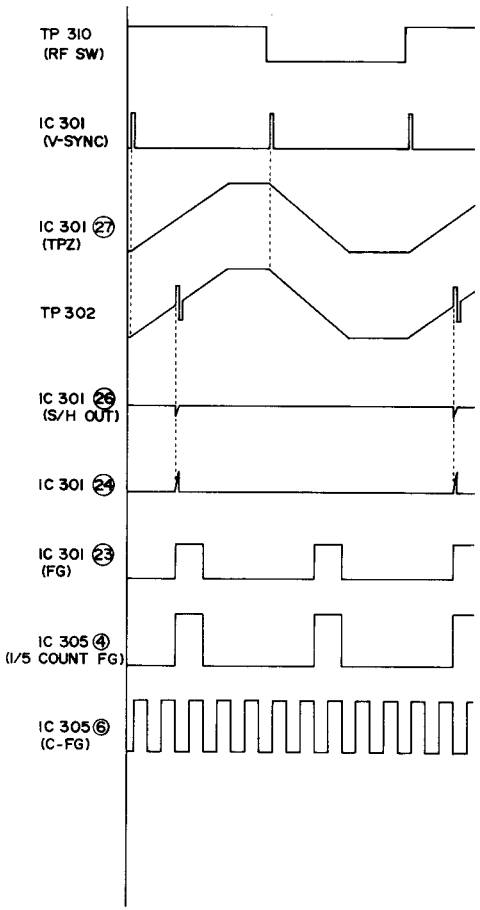
CAPSTAN SPEED CONTROL (PB AND REC)



CAPSTAN PHASE CONTROL (PB)

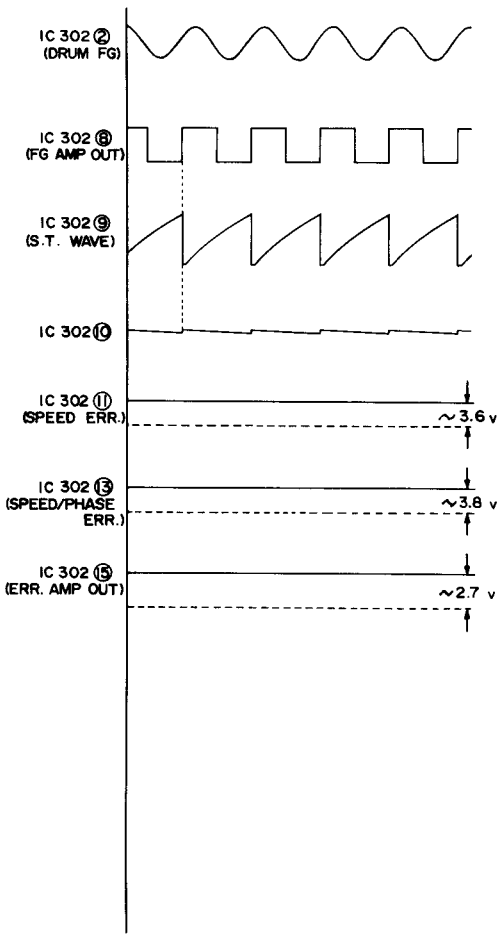


CAPSTAN PHASE CONTROL (REC)

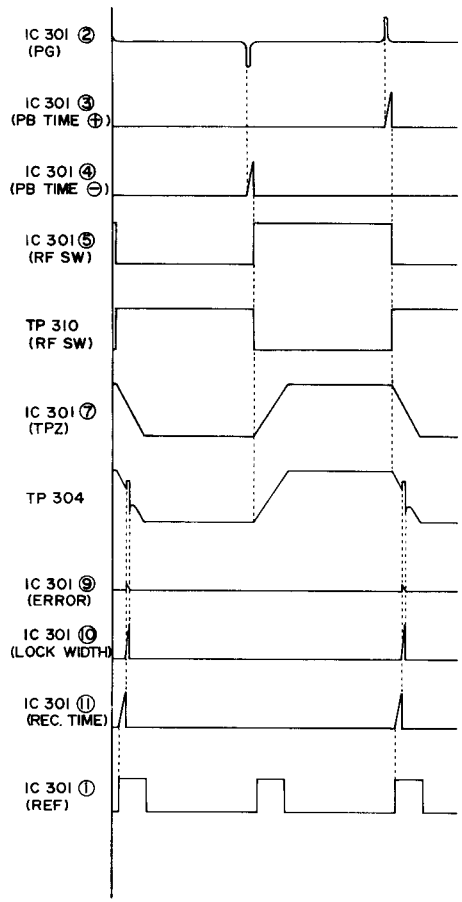


Timing Chart (Drum Servo)

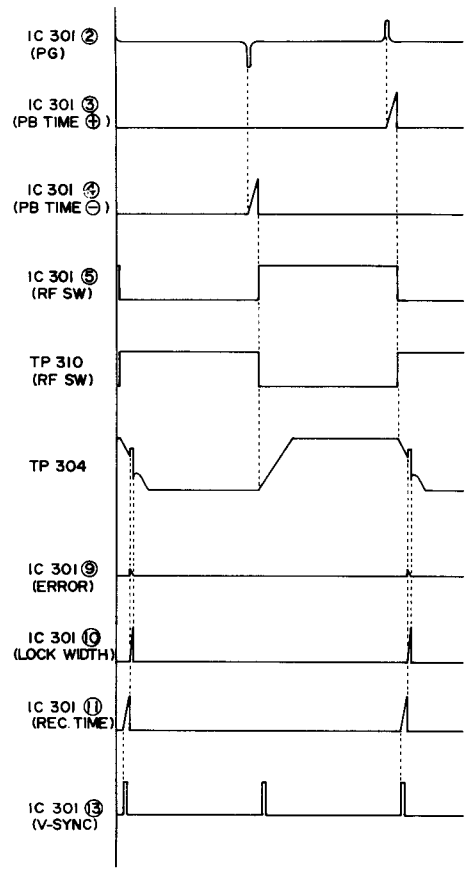
DRUM SPEED CONTROL (PB AND REC)


IC 302 ② (DRUM FG)
IC 302 ⑧ (FG AMP OUT)
IC 302 ⑨ (S.T. WAVE)
IC 302 ⑩
IC 302 ⑪ (SPEED ERR.)
~3.6 v
IC 302 ⑬ (SPEED/PHASE ERR.)
~3.8 v
IC 302 ⑮ (ERR. AMP OUT)
~2.7 v

DRUM PHASE CONTROL (PB)


IC 301 ② (PG)
IC 301 ③ (PB TIME ⊕)
IC 301 ④ (PB TIME ⊖)
IC 301 ⑤ (RF SW)
TP 310 (RF SW)
IC 301 ⑦ (TPZ)
TP 304
IC 301 ⑨ (ERROR)
IC 301 ⑩ (LOCK WIDTH)
IC 301 ⑪ (REC. TIME)
IC 301 ① (REF)

DRUM PHASE CONTROL (REC)


IC 301 ② (PG)
IC 301 ③ (PB TIME ⊕)
IC 301 ④ (PB TIME ⊖)
IC 301 ⑤ (RF SW)
TP 310 (RF SW)
TP 304
IC 301 ⑨ (ERROR)
IC 301 ⑩ (LOCK WIDTH)
IC 301 ⑪ (REC. TIME)
IC 301 ⑬ (V-SYNC)

System Control

1. OUTLINE

A 4-bit microcomputer is used as main composition and motor driving circuit and other necessary functions are provided.

2. FUNCTIONS

This circuit has following functions:

2.1 Operation Key Input

(1) EJECT .....Taking out of tape
(2) STOP .....Stopping
(3) FF/FS .....Fast forward feeding
This plays as FS (FORWARD SEARCH) under PLAY mode.
(4) REW/RS .....Rewinding
This plays as RS (REVERSE SEARCH) under PLAY mode.
(5) PLAY .....Play back.
(6) REC .....RECORDING mode is obtained after this is depressed together with PLAY Button.
(7) PAUSE .....PLAY PAUSE mode is obtained under PLAY mode.
REC PAUSE mode is obtained under REC mode.
(8) NOISE CANCEL ....This is used for noise band removal and is effective for PLAY PAUSE only.

2.2 Other Input

(1) Remote control input

Operation is made possible by the designated wired remote control.

7-key (9 modes)

1 STOP
2 FF/FS
3 REW/RS
4 PLAY
5 REC
6 PAUSE
7 NOISE CANCEL

(2) Camera remote input

REC PAUSE operation is made possible by the camera under REC mode.
(An adapter is required.)

2.3 Control Functions

(1) Video circuit control .....REC, PLAY PAUSE
(2) Audio circuit control .....Muting
(3) Servo circuit control .....REC, PLAY, PAUSE, Drum motor, Capstan motor
(4) Mechanical deck control .....Front loading motor, Loading motor, Brake solenoid
(5) Display LED control .....REC, PLAY, FF, REW, PAUSE
(6) Power circuit control .....Power ON
(7) Control by input from time circuit
and timer circuit control .....Timer Rec, Quick REC, Counter and Display of CAS. IN. and DEW.

2.4 Protection Functions

(1) Tape Start	Automatically stopped at tape start position
(2) Tape End	Automatically rewound at tape end position
(3) Reel rotation abnormal	Automatically stopped when take-up reel is stopped
(4) Drum rotation abnormal	Automatically stopped when drum rotation is stopped
(5) Loading motor abnormal	When abnormal loading or unloading operation is detected, operation is stopped immediately.
(6) Front loading abnormal	Automatically ejected when front loading operation is abnormal When abnormal front unloading operation is detected, operation is stopped immediately.
(7) REC safety	Accidental erase of recorded tape is prevented.
(8) PAUSE time	Automatically stopped after 5 min. under PAUSE mode (excluding STOP PAUSE)
(9) Dewdroplets	Automatically stopped when excessive humidity is detected

3. OUTLINE OF MECHANICAL COMPONENTS

3.1 Loading Motor
This motor executes loading and unloading. It also drives the loading switch which is interconnected to the mechanical components.

3.2 Loading Switch
This switch is turned ON/OFF in connection with the loading motor thereby detecting the position of loading.

3.3 Capstan Motor
This motor turns the capstan and also turns the reel.

3.4 Drum Motor
This motor turns the drum. It is turned under PLAY, REC and PAUSE modes.

3.5 Brake Solenoid
This solenoid is actuated under FF and REW modes only where the brake is released. The solenoid may not be controlled under PLAY and REC modes since mechanical brake is applied.

3.6 Reel Sensor
A pulse of 12 Vp-p is generated when the take-up reel is turned.

3.7 END/START Sensor
This sensor is composed of a phototransistor and is used for tape end and tape start detection.

3.8 Front Loading Motor
This motor drives the front loading mechanism (tape in/out.)

3.9 Front Loading Switch
Four switches are combined and are used for the tape in/out execution and their detection. Switch C is commonly used as the cassette-in switch.

4. CONTROL BY OPERATION KEY

4.1 EJECT

This mode is obtained upon depressing EJECT button, and the cassette is ejected automatically. When this button is depressed directly under other mode, the equipment is once put into STOP mode and upon completion of unloading operation, it is put into EJECT mode. This button is not effective under TIMER REC mode. Furthermore, transfer from this mode to other mode is not made.

4.2 STOP

This mode is obtained upon depressing STOP button, and operation is stopped and unloading operation is executed. This button is not effective under TIMER REC mode.

4.3 FF

This mode is obtained upon depressing FF button, and fast feeding is executed. FF mode is obtained from STOP mode after FR loading operation is finished. FF mode is also obtained from such a status where the tape is loaded as REC and PAUSE after unloading stop or FR loading operation. This button is not effective under TIMER REC mode.
Furthermore, FS (Forward Search) mode is obtained upon depressing FF button under PLAY mode.

4.4 REW

This mode is obtained upon depressing REW button, and rewinding of the tape is started. Operations are same as those for FF button. If REW button is depressed under PLAY mode, RS (Reverse Search) mode is obtained.

4.5 PLAY

This mode is obtained upon depressing PLAY button. After the tape is loaded, play-back operation is executed. This button is effective for STOP, FF, REW, PLAY PAUSE and STOP PAUSE mode only.

4.6 REC

This mode is obtained when PLAY and REC button are depressed at the same time (regardless of the order of button depressing). After the tape is loaded, recording is executed. This button is effective for STOP, FF, REW, PLAY and REC PAUSE mode only.

4.7 PLAY PAUSE

This mode is obtained when PAUSE button is depressed under PLAY mode, and tape running is stopped and a still picture is played-back. Audio is subjected to muting. If this mode is continued for 5 min., the FUNCTION is put into STOP mode. It is released by depressing PAUSE button again and PLAY mode is obtained. PLAY mode is also obtained by PLAY button.

4.8 REC PAUSE

This mode is obtained when PAUSE button is depressed under REC mode. Tape running and recording operation are stopped, and after the tape is rewound as long as 1.5 sec, the FUNCTION is put into stand-by condition. The tape is run by depressing PAUSE button again and 1 sec. later, recording is started. Recording is also started when PLAY and REC buttons are depressed simultaneously.

4.9 NOISE CANCEL

This mode is obtained when NOISE CANCEL button is depressed under PLAY PAUSE mode, and the tape is run at extremely low speed and the noise bar on the still picture is moved while the audio is still subjected to muting. This mode is effective as long as the button is depressed. If the button is released, PLAY PAUSE mode is obtained. PLAY PAUSE mode is also obtained if this button is depressed continuously for more than 5 sec., and NOISE CANCEL mode is obtained when the button is once released and depressed again.

4.10 STOP PAUSE

This mode is obtained when PAUSE button is depressed under STOP mode. If REC and PLAY buttons are depressed simultaneously under this mode, the tape is loaded and the equipment is put into stand-by condition. When PAUSE button is depressed again, it is put into REC mode. Rewinding as long as 1.5 sec. is not executed under this mode.
When EJECT, STOP, FF, REW or PLAY button is depressed, STOP PAUSE mode is cancelled and it is returned to respective mode. Same operation is observed when TIMER MODE signal is input.

4.11 CAMERA PAUSE

This mode is obtained by PAUSE signal coming from the video camera. Same functions as observed for REC PAUSE are provided. However, PAUSE mode is obtained when it is "L" and is released when it is "H".

Note: A camera adapter is required.

4.12 FS (Forward Search)

This mode is obtained when FF button is depressed under PLAY or RS mode. The tape is fast fed and the picture is played-back. The audio is subjected to muting. It is released by FF or PLAY button and the FUNCTION is put into PLAY mode.

4.13 RS (Reverse Search)

This mode is obtained when REW button is depressed under PLAY or FS mode. The tape is fast fed to reverse direction and the picture is played-back. The audio is subjected to muting. It is released by REW or PLAY button and the FUNCTION is put into PLAY mode.

4.14 TIMER REC

This mode is obtained by a control signal from the timer circuit. The tape is loaded and recording is started. This is unchanged except TIMER mode.
TIMER REC mode is obtained when the input from the timer circuit is "H" (microcomputer IC input is "L"). It is released by "L" and STOP mode is obtained.

4.15 ONE TOUCH REC

This mode is obtained by a control signal coming from the timer circuit. The tape is loaded and recording is started. REC mode is obtained when the input from the timer circuit is "H" (microcomputer IC input "L"). It is turned into STOP mode by "L" (microcomputer input "H"). Only STOP button is accepted under REC mode.

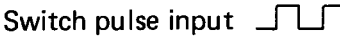
5. MICROCOMPUTER CIRCUIT

5.1.1 Outline of microcomputer LU11417

1) 1-chip 4-bit
2) Clock oscillation circuit is incorporated.
   400 KHz (Oscillating element is provided externally.)
3) An 8-bit A/D converter function is provided and is used for operation key input.
4) P.MOS –9V single power supply
   Terminal 6: V_{DD} (–9V)
   Terminal 64: GND

5.1.2 Outline of microcomputer input and output signals

1) **Input Signals**

Name of Signal	Terminal No.	Description
P. SW	12	"H" when power switch is ON and "L" when timer switch is ON
REEL	16	Reel pulse input
C. PAUSE	4	"L" under CAMERA PAUSE mode.
LD-A. B. C.	13 ~ 15	Detection of loading position (See 6.1)
FL-A. B. C.	44 ~ 42	Detection of front loading (See 6.2)
R. SAFETY	61	Recording is prohibited by "H"
DEW	62	"H" when dew condensation is detected
RES	8	RESET terminal
KEY IN	45	Operation key input
T. REC	3	"L" under TIMER REC mode
Q. REC	2	"L" under Q. REC (quick recording)
M. STOP	20	"L" when the motor is stopped
END. S	63	"H" when tape end is detected
ST. S	1	"H" when tape start is detected
SW PULSE	17	Switch pulse input 

2) **Output Signals**

Name of Signal	Terminal No.	Description
P. ON	24	"H" when P switch input is "H"
PLAY	49	"H" under PLAY (PAUSE search) mode
PAUSE	52	"H" under PAUSE (Play, REC, STOP and CAMERA)
FF	47	"H" under FF and FS modes
REW	48	"H" under REW and RS modes
REC	51	"H" under REC (PAUSE) mode
A. MUT	35	"H" under AUDIO MUTE mode
STOP	46	"H" under STOP mode
REC. INH	26	"H" when recording is prohibited
CAS. IN	56	"H" at cassette in
R. PAUSE	34	"H" under REC PAUSE mode
SP. PB	37	"H" under PLAY PAUSE, RS and FS modes
DY'D. PB	39	"H" under PLAY mode (after AL 1s)
DM. ON	33	"H" under PLAY REC mode
FS	31	"H" under FS mode
RS	30	"H" under RS mode
C. FWD	29	"H" when capstan motor is turned forward
C. REV	28	"H" when capstan motor is turned reversely
C FAST	27	"H" when capstan motor is turned at high speed
DY'D REC	38	"H" under REC mode (AL 1s)
PLNG	58	"H" when brake solenoid is actuated
LM. FWD	22	"H" when loading motor is turned forward
LM. REV	23	"L" when loading motor is turned forward
FL. FWD	60	"H" when front loading motor is turned forward
FL. REV	59	"L" when front loading motor is turned foward

5.1.3 Mode switch/Input signal

1) TIMER REC
This is the control signal by which timer recording is started. REC mode is obtained when microcomputer IC input is "L" and STOP mode is obtained by "H" signal. Automatic rewinding at tape end is not executed. All buttons are not accepted.

2) CAMERA PAUSE
This is PAUSE signal coming from the video camera. PAUSE mode is obtained when it is "L" and PAUSE is released by "H" (REC is initiated). This is effective under REC mode only.

3) POWER SW.
This is an input signal which shows power switch ON/OFF. It is "H" when power switch is ON and "L" when the switch is OFF. If timer switch is ON (timer is stand-by), it is "L" regardless of power switch.

4) QUICK REC.
This is the control signal by which Quick recording is initiated. REC mode is obtained when microcomputer IC input is "L" and STOP mode is obtained when microcomputer IC input is "L" and STOP mode is obtained when it is "H". Only STOP button is accepted under REC mode. After STOP is accepted, ordinary operations are executed, and automatic rewinding at the end of the tape is not done.

5) MEMORY COUNTER STOP
This is STOP signal coming from the tape counter. STOP mode is obtained when microcomputer IC input is "L". This is effective under FF or REW mode only. Same operations as observed for FF → STOP are executed.

5.1.4 Output signal

(1) Deck control signal

1) LM FWD
This is a loading motor normal rotation signal. The motor is normally rotated when it is "H". It is "H" at tape loading.

2) LM REW
This is a loading motor reverse rotation signal. The motor is rotated reversely when it is "H". It is "H" at tape loading.

LM FWD and LM REV signals are related each other.
Controls are executed as shown in Table 6.3.1. Control is required for the sake of change-over of mechanism even at SEARCH and short REW.

3) FL FWD
This is a front loading motor normal rotation signal. It is "H" at cassette DOWN operation.

4) FL REV
This is a front loading motor reverse rotation signal. It is "H" at cassette UP operation.

FL FWD and FL REV signals are related each other.
Controls are executed as shown in Table 6.3.2. is designed that when the front loading motor

5) CAP FWD
This is a capstan motor normal rotation signal (tape is fed to normal direction). It is "H" under PLAY, REC, FF and N. CANC modes.

6) CAP REV
This is capstan motor reverse rotation signal (tape is fed to reverse direction). It is "H" under REW, short REW and UNLOADING modes. Pulse is output under N. CANCEL mode. CAP FWD and CAP REV signals are related each other.
Controls are executed as shown in Table 6.3.3. It is designed that when the capstan motor is stopped, the brake is applied electrically for 0.2 sec.

7) PLNG
This is a brake solenoid control signal. It becomes "H" under FF and REW modes and the reel brake is released. This is STOP signal (especially by means of END sensor and START sensor under FF and REW modes) which becomes to "L" within 2 mS and the brake is applied.

8) CAP FAST
This is a signal by which the capstan motor is rotated at high speed (or full torque). It is "H" under FF, REW, UNLOADING and PAUSE (N. CANC) modes.

(2) Display signal

1) STOP
This is a STOP lamp lighting signal. It is "H" under STOP mode.

2) PLAY
This is a PLAY lamp lighting signal.It is "H" under PLAY, PLAY PAUSE, N. CANCEL F-SEARCH and R-SEARCH modes.

3) REC
This is a REC lamp lighting signal. It is "H" under REC and REC PAUSE modes.

4) PAUSE
This is a PAUSE lamp lighting signal.It is "H" under PLAY PAUSE, N.CANCEL REC PAUSE, CAMERA PAUSE and STOP PAUSE modes.

5) FF
This is a FF lamp lighting signal. It is "H" under FF and F-SEARCH modes.

6) REW
This is a REW lamp lighting signal. It is "H" under REC and R-SEARCH modes.

7) CAS IN
This is a cassette-in indicating lamp lighting signal. It is "H" at cassette DOWN operation. It becomes "L" when only cassette holder is in DOWN operation (without tape).

(3) Circuit control signal

1) DLY'D PLAY
This is a PLAY signal for video and audio. It becomes "H" at 1.0 sec. after loading is completed under PLAY mode. It becomes immediately to "L" after PLAY is released.

2) DLY'D REC
This is a REC signal for video. It becomes "H" at 1.0 sec. after loading is completed under REC mode. It becomes immediately to "L" after REC is released. It becomes "L" under REC PAUSE mode. It becomes again to "H" at 1.0 sec. after REC PAUSE is released.

3) REC PAUSE
This is a servo control signal under REC PAUSE mode. It is "H" under REC PAUSE mode.

4) SP PLAY
This becomes "H" under PLAY PAUSE, F-SEARCH, R-SEARCH, N.CANCEL and SLOW modes. It becomes to "L" at 1.0 sec. after releasing.
Simulated V-SYNC added signal

5) DM ON
This is a head drum rotation signal. It is "H" under PLAY, REC, PLAY PAUSE, REC PAUSE, A.DUB, N.CANCEL F-SEARCH, and R-SEARCH modes.

6) FS
This is a servo control signal under FORWARD SEARCH mode. It is "H" under F-SEARCH mode.

7) RS
This is a servo control signal under REVERSE SEARCH mode. It is "H" under R-SEARCH mode.

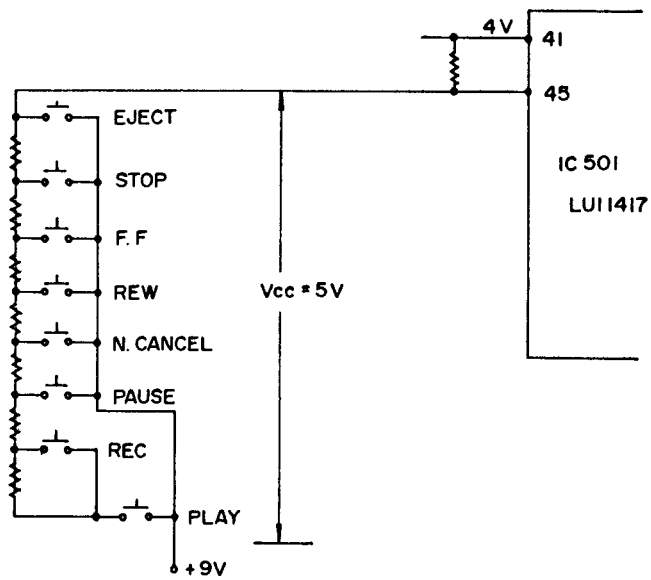
8) AUDIO MUTE
This is an audio muting signal. It becomes "H" when SP PLAY signal is "H" and becomes "H" temporarily at PLAY → REC and REC → PLAY transfer period.

9) TIMER INH
This signal is used to prohibit timer operation. It becomes OR of END sensor, DEW sensor, REC SAFETY and FL-C regardless of operation mode. Timer operation is prohibited under "H".

10) POWER ON
This signal is used to control the power. The power 12V is turned to ON when this signal is "H".

5.2 Operation Key Circuit

5.2.1 Operation key conversion circuit



(Fig. 5.2.1)

5.2.2 Simultaneous depressing of operation buttons
As it is apparent from above circuit, when more than 2 buttons are depressed, higher conversion voltage one is output. For example, if FF, REW ... PLAY buttons are depressed simultaneously with STOP button, output buttons are depressed simultaneously with STOP button, output voltage is unchanged.

5.2.3 Simultaneous depressing mode
When PLAY and REC are depressed simultaneously, REC mode prevails regardless of the order of depressing. In other cases, the mode which is depressed earlier prevails.

5.2.4 Signal conversion of operation button

Signals of operation buttons are converted into analog signals by the circuit as shown in Fig. 5.2.1. Conversion voltages are as follows:

Operation button	Conversion voltage	Operation button	Conversion voltage
EJECT	0	PAUSE	Vcc x 5/10
STOP	Vcc x 1/10	REC	Vcc x 7/10
FF	Vcc x 2/10	PLAY	Vcc x 9/10
REW	Vcc x 3/10	NOP	Vcc
N. CANCEL	Vcc x 4/10		

Note: NOP means the case where no button is depressed.

6. OPERATION OF CIRCUITS

6.1 Control of switches and motors under each mode

6.1.1 Loading switch

1) Position of loading switch

LD SW.			Symbol	Position
A	B	C		
1	1	1	FR (FR LOADING)	FF. REW
0	1	1	(Fu)	
0	0	1	(UN (UN-LOADING)	STOP EJECT
1	0	1	(US)	
1	0	0	ST (SHORT STOP)	Loading motor is stopped temporarily at unloading
1	1	0	(AS)	
0	1	0	AL (After-loading)	PLAY. REC. PAUSE. SHORT REW

0: MAKE 1: BRAKE

Blank means intermediate position.

Table 6.1.1

2) Operation of loading switch

The loading switch has 3 circuits being interlocked with loading mechanism, and operational status of the loading mechanism is shown. The loading mechanism executes controls of pinch roller, brake and gear change-over as well as tape loading. The relation between the loading switch and the loading mechanism is as follows:

a) FR (FR Loading) position

The loading position where brake is released under FF or REW mode.

b) UN (Unloading) position

Loading position under EJECT or STOP mode.

The brake is applied and the pinch roller is detached.

c) AF (After loading) position

Position under PLAY, REC and PAUSE mode.

This position is also maintained under REC PAUSE, FS, RS and N. CANCEL mode.

The tape is loaded and the pinch roller is contacted by pressure. The brake is released.

d) ST (Short Stop) position

The position where the loading motor is stopped temporarily while the tape is unloaded.

Temporary stopping is provided in order to remove possible slack of the tape at unloading.

The pinch roller is detached at this position.

e) FU, US and AS position

These are intermediate position of FR, UN, ST and AF.

These positions are used at such a case, where the power is once disconnected and it is restored, to know the position of the loading mechanism.

6.2 FRONT LOADING SWITCH

6.2.1 Three (3) independent switches are provided and are used for detection of IN, UP and DOWN of the cassette.

FL-A	L at ON	Cassette IN is detected.
FL-B	L at ON	Cassette Up is detected.
FL-C	L at ON	Cassette DOWN is detected.

Table 6.2.1

6.2.2 Operation of front loading switch

Controls of tape in and out are executed according to the status of FL-A, B and C switches.

FL-A Two switches are connected in series and when both of them are turned to ON, front loading (cassette in) is executed.

FL-B When this switch is turned to ON during front unloading (cassette up), operation is stopped.

FL-C When this switch is turned to ON during front loading (cassette in), operation is stopped.

6.3 CONTROL OF EACH MOTOR

6.3.1 Loading motor control

LM. FWD	LM. REV	Motor	Remark
L	L	Stop (Idle rotation)	Stopped Brake is not applied.
L	H	Reverse rotation	Unloading FR loading direction.
H	L	Normal rotation	Loading direction.
H	H	Brake	Immediate stopping.

(Table 6.3.1)

6.3.2 Front loading motor control

FL. FWD	FL. REW	Motor	Remark
L	L	Stop (Idle rotation)	Stopped Brake is not applied.
L	H	Reverse rotation	Cassette UP direction.
H	L	Normal rotation	Cassette DOWN direction.
H	H	Brake	Immediate stopping.

(Table 6.3.2)

6.3.3 Capstan motor control

CAP. FWD	CAP. REV	Motor	Remark
L	L	Stop (Idle rotation)	Stopped Brake is not applied.
L	H	Reverse rotation	Capstan reel reverse rotation direction.
H	L	Normal rotation	Capstan reel normal rotation direction.
H	H	Brake	Immediate stopping.

(Table 6.3.3)

6.4 DESCRIPTION OF OPERATIONS

(Following description is intended for operations around the microcomputer.)

6.4.1 PLAY Operation (Timing Chart 6.4.1)

When PLAY button is depressed, STOP becomes "L" (IC501, pin (46)) and PLAY becomes "H" (IC501, pin (49)) and they are so displayed, and the servo circuit is changed over to PLAY mode.

CAP. FWD becomes "H" (IC501, pin (29)) and DM ON becomes "H" (IC501, pin (33)), and the capstan motor is turned forward.

LM. FWD becomes "H" (IC501, pin (22) → IC502, pin (2)) after 0.4 sec, and the loading motor is turned forward thereby starting tape loading.

When the loading switch is positioned at AL, both LM. FWD and LM. REV (IC501, pin (23)) become "H", and the loading motor is stopped. After that, both LM. FWD and LM. REV become "L". One second after AL, DY'D PB becomes "H" (IC501, pin (39)), and the video circuit is changed over from E-E mode to PLAY mode. At this instance, A MUTE is kept at "H" (IC501, pin (35)) for 1 sec and an audio mute is applied.

6.4.2 PLAY PAUSE → NOISE CANCEL Operation (Timing Chart 6.4.1)

When PAUSE button is depressed under PLAY mode, CAP. FWD (IC501, pin (29)), DYD PB (IC501, pin (39)), DM ON (IC501, pin (33)) and PLAY (IC501, pin (40)) are unchanged while PAUSE (IC501, pin (52)) and CAP. REV (IC501, pin (28)) become "H" thereby controlling the servo circuit and eventually stopping the capstan motor.

Then SP. PB (IC501, pin (37)) becomes "H", the video circuit is controlled and a simulated V-SYNC is added while A. MUTE (IC501, pin (35)) becomes "H" and an audio muting is executed under PAUSE mode.

When NOISE CANCEL button is depressed under PAUSE mode, CAP. REV signal (IC501, pin (28)) is changed from "H" to "L" with pulse-like manner (see Timing Chart), and the capstan motor is turned at low speed.

In order to operated the capstan motor surely at low speed, CAP. FAST (IC501, pin (27)) is turned to "H" so that the motor is turned with full torque.

The capstan motor is turned at low speed as long as NOISE CANCEL button is being depressed. By this operation, a noise bar is moved from the screen. If the button is released, the capstan motor is stopped.

If NOISE CANCEL button is depressed continuously for 5 sec, PLAY PAUSE mode is obtained. If it is once released and depressed again, NOISE CANCEL mode is obtained.

When either PAUSE button or PLAY button is depressed under PAUSE mode, it is transferred to PLAY mode. Furthermore, PAUSE mode is discontinued after 5 min continuance and is transferred to STOP mode.

6.4.3 PLAY → STOP Operation (Timing Chart 6.4.2)

After STOP button is depressed, both CAP. FWD and CAP. REV (IC501, pins (29) and (28)) are turned to "H" for 0.2 sec thereby stopping the capstan motor. After that, LM. REV (IC501, pin (23)) is turned to "H" while CAP. REV is remained at "H" and the loading motor and the capstan motor are turned reversely.

When the loading switch comes to ST position, LM. FWD (IC501, pin (22)) becomes "H" thereby stopping the loading motor and turning the capstan motor reversely. Thus gear shift is carried out. After 0.5 sec, LM. REM (IC501, pin (23)) becomes "L" thereby turning the loading motor forward and when it is located at AL position, the pinch roller makes tight contact with it. Since the capstan motor is turned reversely, the tape is taken up to reverse direction. After 1.5 sec., CAP. FWD (IC501, pin (29)) becomes "H" and the capstan motor is stopped for 0.2 sec.

After that, the loading motor and the capstan motor are again turned reversely thus unloading operation is initiated. At this moment, CAP. FAST (IC501, pin (27)) is turned to "H".

When the loading switch is located at ST position, the loading motor is solely stopped for 0.5 sec. This is provided for the sake of prevention of slackened tape. After that, the loading motor is again turned reversely, and both loading motor and capstan motor are stopped at UN position. Furthermore, an audio mute is applied for 1.0 sec when STOP button is depressed (PLAY → STOP transfer). This unloading operation takes place with entirely identical timing for transfer operations from operational mode having loading status.

However, an audio mute is not applied form REC mode.

6.4.4 REC Operation (Timing Chart 6.4.3)

This mode is obtained when REC button and PLAY button are depressed simultaneously. Both loading and unloading operations are identical with those as observed under PLAY mode. If the button is depressed, however, REC (IC501, pin (51)) becomes "H", CL-11 (2) PLAY output is turned to "H" through D514, and LEDs for REC and PLAY are lighted. DYD REC (IC501, pin (38)) becomes "H" 1.0 sec after AL, and the video servo circuit is controlled.

6.4.5 REC PAUSE operation

When PAUSE button is depressed under REC mode, REC PAUSE mode is obtained. At this instance, DY'D REC (IC501, pin (38)) becomes "L" thereby stopping recording.
Subsequently, the loading motor and the capstan motor are controlled and the tape is rewound for 1.5 sec.
Operations in this case are same as those at unloading operation. After that, the loading motor is again turned reversely and the capstan motor is turned forward.
Gear shift is executed when the loading switch is located at ST position.
After that, LM. FWD (IC501, pin (22)) becomes "H", the loading motor is turned forward and is stopped when the loading switch is located at AL position (pinch roller makes tight contact with it) and REC PAUSE mode is obtained.
CAP. FAST (IC501, pin (27)) is turned to "H" whenever the gear is shifted.
PAUSE mode is released by depressing PAUSE or REC button, and PLAY button simultaneously, CAP. FWD (IC501, pin (29)) becomes "H" and the capstan is turned. After 1.0 sec, DY'D REC becomes "H" and REC mode is obtained.
If REC PAUSE mode is continued for 5 min, it is transferred to STOP mode.

6.4.6 FF, REW and STOP Operations (Timing Chart 6.4.4)

When FF button is depressed, FF (IC501, pin (47)) and PLNG (IC501, pin (58)) becomes "H", FF display is made, Q503 and 504 are turned to ON, PLNG is actuated and the brake is released. CAP. FAST (IC501, pin (27)) then becomes "H". LM. REV (IC501, pin (23)) becomes "H", the loading motor is turned reversely and FR loading is executed. When the loading switch is located at FR position, the loading motor is stopped, CAP. FWD (IC501, pin (29)) becomes "H" and the capstan motor is turned forward at full torque. When STOP button is depressed, CAP. REV (IC501, pin (28)) becomes "H" for 0.2 sec thereby stopping the capstan motor immediately. After that, LM. FWD (IC501, pin (22)) becomes "H", the loading motor is turned forward and front unloading is executed. When the loading switch is located at UN position, both LM. FWD and LM. REV are turned to "H", the loading motor is stopped, both LM. FWD and LM. REV are turned to "L" and STOP mode is obtained.
In case of REW mode or REW mode is transferred to STOP mode, conduct same operations as observed for FF mode. However, the capstan motor is turned reversely and the timing chart is different.

6.4.7 PLAY → FS → PLAY and Each Mode (Timing Chart 6.4.5)

When FF button is depressed under PLAY mode, FS mode is obtained. FS (IC501, pin (31)) and SP.PB (IC501, pin (37)) become "H" thereby controlling the servo circuit and the video circuit.
Furthermore, FF (IC501, pin (47)) become "H" and both PLAY and FF are displayed. A.MUTE (IC501, pin 35) becomes "H" and the sound is muted during FS mode.
When each button is depressed under FS mode, FS, FF and SP.PB become "L" and is transferred to each mode. A.MUTE becomes "L" 1.0 sec later. However, if FF or PLAY button is depressed, PLAY mode is obtained. At this instance, CAP.REV (IC501, pin (28)) becomes "H" for 0.1 sec threby applying the brake to the capstan motor. The motor is then turned forward. SP.PB and A.MUTE become "L" 1.0 sec later and PLAY mode is obtained.

6.4.8 PLAY → RS → PLAY and Each Mode (Timing Chart 6.4.5)

When REW button is depressed during PLAY mode, RS mode is obtained. At this moment, gear shift is executed which is not executed in FS mode. Other operations are same as those observed under FS mode. Therefore, the following description deals with different operations from FS mode: Upon depressing REW button, LM.REV (IC501, pin (23)) becomes "H", CAP.REV (IC501, pin (28)) becomes "H", the loading motor is truned reversely and the capstan motor is stopped immediately.
When the loading switch is located at ST position, LM.FWD (IC501, pin (22)) becomes "H" thereby stopping the loading motor, and CAP.FWD (IC501, pin (29)) becomes "L" thereby turning the capstan motor reversely. Gear shift is thus executed. After 0.5 sec, LM.REV becomes "L" and the loading motor is turned forward. When the loading switch is located at AL position, LM.REV is turned to "H" for 0.1 sec and subsequently, both LM.FWD and LM.REV are turned to "L" thereby stopping the motor and running the tape to reverse direction.

If each operation button is depressed during RS mode, it is transferred to each mode.
When either REW or PLAY button is depressed, it is transferred to PLAY mode. At this instance, CAP.FWD becomes "H", LW.REV becomes "H" and the capstan motor is stopped immediately. In the meantime, the loading motor is turned reversely and is stopped with the loading switch comes to ST position, CAP.REV becomes "L" and the capstan motor is turned forward. Thus gear shift is carried out. After 0.5 sec, LM.REV becomes "L" (LM.FWD is remained at "H"), the loading motor is turned forward and is stopped when the loading switch comes to AL position, and PLAY mode is obtained.
Other operations are same as those observed under FS mode.

6.4.9 FS → RS → FS Operation (Timing Chart 6.4.6)
When REW button is depressed during FS mode, RS mode is obtained. FS (IC501, pin (31)) and FF (IC501, pin (47)) become "L" and RS (IC501, pin (30)) and REW (IC501, pin (48)) become "H", and serve control and change over of mode display are made.
LM.REW (IC501, pin (23)) and CAP.REV (IC501, pin (28)) become "H", the loading motor is turned reversely and the capstan motor is stopped immediately. When the loading switch is located at ST position, LW.FWD (IC501, pin (23)) becomes "H" and CAP.FWD becomes "L", the loading motor is stopped and the capstan motor is turned reversely.
Thus gear shift is carried out.
After 0.5 sec, LM.REV becomes "L" (LM.FWD is reamined at "H"), the loading motor is turned forward, the loading motor is stopped when loading switch comes to AL position and RS mode is obtained. In the meantime, A.MUTE and SP.PB are unchanged.
When FF button is depressed during RS mode, FS mode is obtained. Operations are similar to those observed at FS → RS. However,the capstan motor is turned forward under FS mode. Each signal is different. See Timing Chart.

6.4.10 PLAY → (DRUM SENSOR ON) → STOP (Timing Chart 6.4.7)
When drum turning is stopped and SW PULSE becomes "H" or "L" under PLAY mode (also REC, PLAY PAUSE and REC PAUSE modes), the drum sensor is actuated 2 sec later and unloading is initiated. Operations in this case are same as those observed at PLAY → STOP. However, rewinding operation for 1.5 sec is not executed, but unloading is initiated immediately. Subsequently, each operational button is made effective.

6.4.11 FF → (END SENSOR) → REW (Timing Chart 6.4.8)
When END sensor becomes "H" during FF mode, within 2 msec, PLNG (IC501, pin (58)) becomes "L", CAP.REV (IC501, pin (28)) becomes "H", FF (IC501, pin (47)) becomes "L", REW (IC501, pin (48)) becomes "H" and CAP.FAST (IC501, pin (27)) becomes "L" thereby applying the brake to stop the motor immediately.
Further 0.2 sec later, CAP.REV becomes "L" and 0.5 sec later, it again becomes "H", CAP.FAST becomes "H", PLNG becomes "H", the brake is released, the capstan motor is turned reversely with full torque and it is transferred to AUTO REW mode. The loading motor is not actuated at this instance.
Furthermore, if END sensor becomes "H" during PLAY, REC, NOISE CANCEL and FS mode, it is transferred to REW mode after unloading has been completed.

6.4.12 REW → (START SENSOR) → STOP (Timing Chart 6.4.8)
When START sensor becomes "H" during REW mode, within 2 msec. PLNG (IC501, pin (58)) becomes "L", CAP.FWD (IC501, pin (29)) becomes "H", CAP.FAST (IC501, pin (27)) becomes "L", REW (IC501, pin (48)) becomes "LL", the brake is applied and the capstan motor is stopped immediately and at the same time, it is transferred to STOP mode. (Same operations as observed at REW → STOP)
When START sensor becomes "H" during PLAY → STOP operation or REC PAUSE operation, unloading operation is executed while not rewinding REC PAUSE operation, unloading operation is executed while no rewinding operation is made.

6.4.13 Cassette In Operation (Timing Chart 6.4.9)

When the cassette is inserted from door portion, FL-B switch is turned to OFF (FL-B: "H" IC501, pin (43)) and if it is inserted further, FL-A switch is turned to ON (FL-A: "L" IC501, pin (44)). If FL-A switch is positioned at ON for more than 0.2 sec, FOL FWD (IC501, pin (60)) becomes "H", pin (2) of IC503 becomes "H" and front loading (cassette down operation) is executed. If FL-C switch is turned to ON subsequently (FL-C "L": IC501, pin (42)). FL.REV (IC501, pin (59)) becomes "H" and the front loading motor is stopped. After 0.1 sec, both FL.FWD and FL.REV becomes "L".

If FL-A is turned to OFF within 0.2 sec, cassette in operation is not accepted.

6.4.14 Eject Operation (Timing Chart 6.4.9)

When EJECT button is depressed during STP mode, CAP. FAST (IC501, pin (27)) becomes "H", PLNG (IC501, pin (58)) becomes "H" and LM. REV (IC501, pin (23)) becomes "H", the brake is released, front loading is executed and the loading motor is stopped at loading switch FR position. At this instance, CAP. REV (IC501, pin (28)) is turned to "H" for 0.1 sec, the capstan motor is turned reversely with full torque to remove possible slack of the tape. Subsequently, both CAP. FWD and CAP. REV are turned to "H" for 0.2 sec thereby stopping the motor immediately.

PLNG becomes "L" thereby applying the brake. CAP. FAST also becomes "L". Subsequently, LM. FWD (IC501, pin (22)) is turned to "H" to execute front unloading switch is located at UN position, the loading motor is stopped. Further 0.5 sec later, FL. REV (IC501, pin (59)) becomes "H" to execute front unloaidng (cassette up). When FL-B switch is turned to ON (FL-B becomes "L"), both FL. FWD and FL. REV are turned to "H" thereby stopping the front loading motor. (Both FL. FWD and FL. REV are turned to "L" at 0.1 sec later.)

When START sensor becomes "H" during short REW mode of 0.1 sec under EJECT mode, REW is interrupted and EJECT operation is executed.

When START sensor has already been "H" before EJECT button is depressed, EJECT is executed without doing SHORT REW. SHORT REW is not executed also for the case where EJECT button is depressed under STOP PAUSE mode.

When EJECT button is depressed under PLAY, REC, PLAY PAUSE and REC PAUSE modes, unloading is once executed and after it is transferred to STOP mode, foregoing operations are executed.

When the tape is inserted and EJECT button is depressed before cassette down (FL-C ON), EJECT operation is executed immediately.

6.4.15 Loading Motor and Front Loading Motor Driving Circuits Operational mode of IC BA6209 (IC502 and 503) for motor driving is shown in Table 6.4.15. Normal or reverse turning of the motor is controlled by input signals of F_{IN} and R_{IN}. Following description deals with protection operations taken when an abnormality is occurred.

FIN (5)	RIN (6)	VOUT 1 (2)	VOUT 2 (10)
1	1	L	L
0	1	L	H
1	0	H	L
0	0	L	L

Table 6.4.15

When the loading motor is not turned for some reason, excessive current flows into R521, the potential at pin 8 of IC502 is lowered, it is integrated by C511 and R523 and approximately 2.5 sec later, Q507 is turned to ON. After Q507 is turned to ON, Q502 is turned to ON too, the voltage at pin (4) of IC502 becomes "L", the output of V_{OUT} 1 or $V_{PUT}2$ becomes "L" regardless of IC502 F_{IN} or R_{IN} and turning of the motor is stopped.
When the motor is stopped, electric current is not flowed and is restored, and foregoing operations are repeated. After 7 sec, however, IC501 turns the output signal (LM. FWD or LM. REV) to "L" thereby prohibiting all operations. Circuits are thus protected. Identical operations are observed for the front loading circuit.

6.5 SENSOR CIRCUIT AND PROTECTION CIRCUIT

6.5.1 Reel Sensor Circuit

The reel sensor is composed of magnet that is mounted on the take-up reel and an hall element. When the reel is turned, 12Vp-p pulse is generated. This pulse is converted into 9V and is input to pin (16) of IC501. When the interval of the pulse becomes extremely long or no pulse is available, reel input terminal (IC501, pin (16)) of IC501 is fixed to "H" or "L". When this status is maintained for more than 5 sec, it is judged that the reel stopped turning, unloading is executed and it is stopped. After that, all operations are prohibited. However, EJECT is available.
As for resetting, once turn OFF the power supply and turn it to ON again. Operation is available under PLAY, REC, FS, RS, FF and REW modes. No operation is available under PAUSE, N. CANCEL and STOP modes.

6.5.2 Start Sensor Circuit

Transparent tape portion is detected optically using a LED and a phototransistor provided for the tape start position detection. When it comes to the tape start position (position of tape reader), a light enters into the phototransistor and the transistor turns to ON. Therefore, Q506 turns to ON, ST. S input (IC501, pin (1)) becomes "H" and it is transferred to STOP mode.
See 6.4 for the details of operation timing. Operations are executed during short REW of each REW, REC PAUSE and RS.

6.5.3 End Sensor Circuit

Same operations as observed by start sensor are executed. However, REW operation is initiated after detection is done. Operations are executed during PLAY, REC, N. CANCEL, FF and FS modes. It is transferred to STOP mode in the case of TIMER REC and Q. REC modes. (No REW operation is executed.)

6.5.4 Drum Sensor Circuit

When the tape is run while the drum motor is not turned, the tape is disengaged from the guide post and may be damaged. This circuit is used for detection of drum motor turning and if an abnormality is found, it is transferred to STOP mode.
The head switching pulse is input into the microcomputer. (IC501, pin (17)) When drum turning is stopped, it is fixed at either "H" or "L". If "H" or "L" is continued for more than 2 sec, it is judged that the turning is stopped, it is unloaded and is transferred to STOP mode. After that, operational buttons are made effective. Operations are executed during PLAY, REC, FS, RS PAUSE and N. CANCEL modes.

6.5.5 Dew Sensor Circuit

When dew condensation is caused at the drum, the tape may be stuck and damaged. It is therefore designed in such that, if any condensation is detected, the device is put into STOP mode.
Under high humidity ambient condition, the resistance of dew sensor is rapidly increased, the base potential of Q509 is increased and Q509 is eventually turned to OFF.
Dew input terminal (IC501, pin (62)) of the microcomputer becomes "H" and the device is put into STOP mode. No operational buttons other than EJECT are accepted during "H" mode.
At the same time, Q510 turns to OFF and dew display signal is output to the timer circuit. Q511 is turned to OFF and turns the drum ON signal to "H" via D509 so that the drum is turned as long as condensation exists.

6.5.6 REC Safety

When REC safety switch is OFF, microcomputer R. SAFETY input becomes "H" (IC501, pin (61)) thereby prohibiting REC mode and timer mode operations.

6.5.7 Cassette In

When FL-C is "H" (IC501, pin (42)) or both ST.S (IC501, pin (1)) and ENS. S (IC501, pin (63)) are "H", it is judged that no cassette exists and operations other than EJECT are prohibited.

6.5.8 Loading Circuit Protection

When the loading switch is not positioned a the designated mode 7 sec after the motor is driven in the loading circuit operation, both LM. FWD (IC501, pin (22)) and LM. REV (IC501, pin (23)) are turned to "L" where no operational buttons other than EJECT are accepted. Once turn OFF the power and turn it to ON again to reset the device.

6.5.9 Front Loading Circuit Protection

When FL-C (cassette down) is not turned to ON 4 sec after FL-A switch is turned to ON and operation is initiated at cassette down operation, cassette down operation is interrupted and EJECT operation is executed.

As cassette up operation, both FL. FWD (IC501, pin (60)) and FL. REV (IC501, pin (54)) are turned to "L" thereby interrupting the operation. After that, no operation is accepted. Once turn OFF the power and turn it to ON again to reset the device.

6.5.10 Protection of Tape under PAUSE Mode

The tape may be damaged if PAUSE mode is continued for a long time. It is therefore designed in such that, if this mode is maintained for more than 5 min, the device is automatically put into STOP mode.

After CAMERA PAUSE is released, STOP PAUSE mode is obtained. (Operations under CAMERA PAUSE mode are identical with those as observed under REC PAUSE mode.)

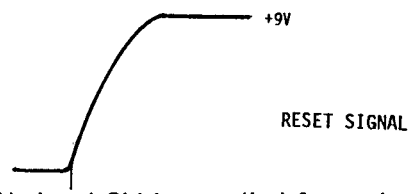
6.5.11 Power Switch OFF

When the power switc is turned to OFF under each mode, it is transferred to STOP mode and the power is turned to OFF. If above operation is attempted under CASSETTE IN or EJECT mode, the power is turned to OFF after each operation is completed.

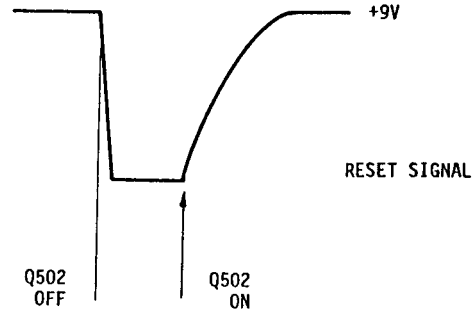
6.6 OTHER CIRCUIT

6.6.1 Microcomputer Reset Circuit

After the primary side power is turned to ON ALL 12V is supplied, it is converted to 9V by the regulator circuit of Q501, and C523 is charged through R508. Therefore, following signal is input to RES terminal (IC501, pin (8)) and it is reset.



When power switch is turned to ON, power switch ON signal 9V is supplied form the timer circuit (CL-10 1D). Therefore, charging of C524 is done through R505. As long as charging is done, Q502 is kept ON, C523 is discharged and RES terminal is turned to "L". After that, Q502 is turned to OFF, RES terminal becomes "H" again and the device is reset.



Description of PAL Audio Circuit

1. Circuit

(1) Recording and playback circuits are consisted by using IC701 BA5115.

(2) Q701 is used for erase and bias oscillation. In the meantime, Q702 and Q703 controls the base of Q701 to cause and to stop oscillation.

(3) The circuit which is composed of Q704, 705, 706 and 707 is intended for selection of REC/PLAY heads. Q705 and 706 are turned to ON under PLAY mode, and Q707 is turned to ON under REC mode.

(4) Under PLAY mode, the signal coming from the head is input to No.4 pin of IC and is output form No.11 pin. Under CUE, REV and STILL modes, No.10 pin is turned to "H" and an audio muting is applied. VR702 is intended for control of playback output level.

(5) Under REC mode, the audio input is input to No.18 pin of IC, the signal to which ALC is applied is output from No.7 pin, is mixed with bias oscillation and is recorded to the head. VR701 is intended for control of bias level.

Description of PAL Tuner Circuit

1. Circuit

(1) Front end of the tuner and IF circuit are built into one block.

(2) As for the external circuit, the muting voltage is taken from the emitter of Q805 making use of temporarily open instance of SW809 when selection switch is manipulated by Q805.

(3) As for manipulation of selection switch 809, selections of LED, band and of turning voltage are executed simultaneously by the switch of one circuit. Q802 ~ Q804 are intended for driving of band selection and Q806 is intended for tuning. In the meantime, D842 ~ 853 are provided to remove the effect due to other channels than the channel being selected by band switch, D830 ~ 841 are removed the effect due to other channels than on being selected by tuning voltage and D806 ~ 817 are provided for protection against reverse voltage of LED for channels being not selected.

(4) Q709 is provided for prevention of hop sound caused at channel selection.

(5) IC702 is a tuner equipped with CATV. It transmits the sound mute signal when, with the model having FTZ sound mute, the signal other than TV signal is input, and the sound caused is cut by Q709. It is also used for cutting the sound between channels.

(6) Q710 is provided to apply AFT defeat temporarily in order to prevent synchronizing deviation at channel selection by the tuner with CATV while AFT is ON.

Description of PAL Timer Circuit

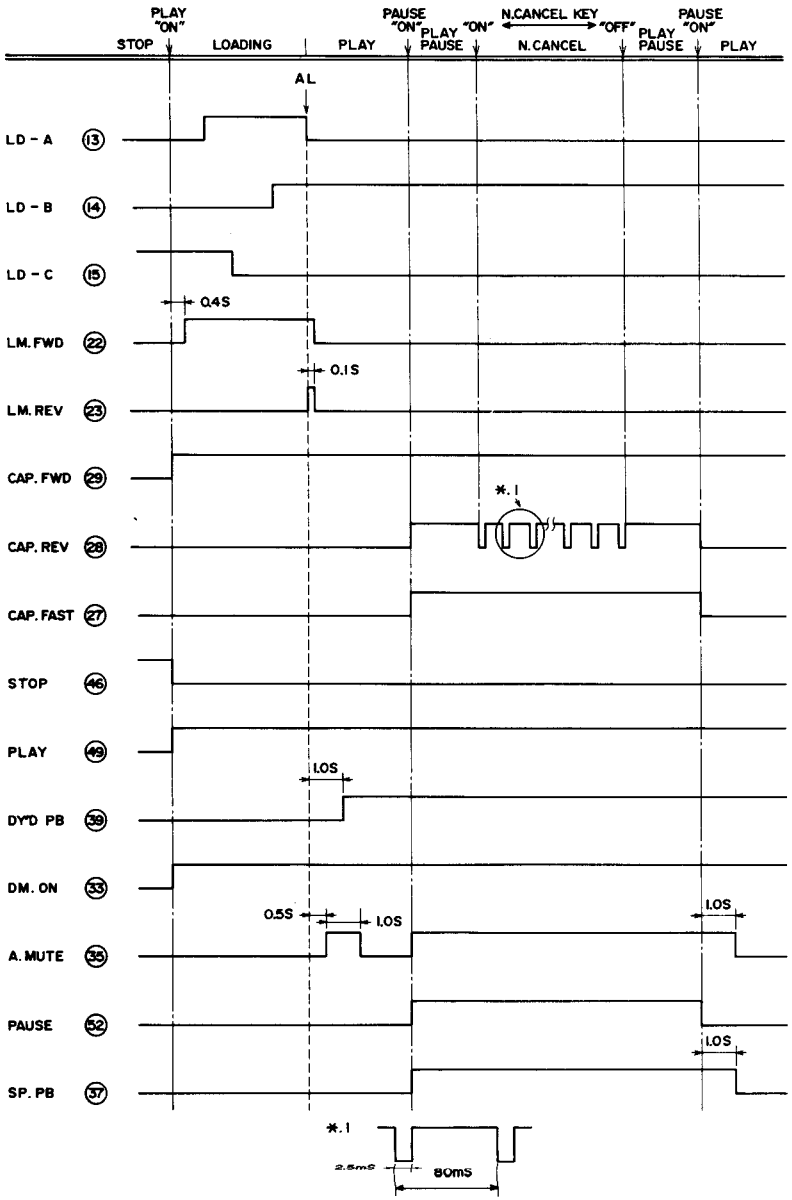
1. **Circuit**
   (1) The circuit is composed of LSI LU52511 and LED tube.
   (2) Flickering of LED tube is of dynamic lighting method.
   (3) The reference of the clock is of quartz method by crystal of X801 32,768K.
   (4) 1G ~ 8G are intended for grid driving and a ~ i are for anode driving.
   (5) No.1 pin input of IC802 8041 is provided for power failure detection.
2. **Operation**
   (1) When power cord is connected or when power failure is restored, it flashes with 0.00. It is turned to steady lighting after CLOCK is depressed. Display disappears upon depressing START END. If CLOCK is depressed again, it is turned to steady lighting.
   (2) Correction is done by depressing DAY, H and M while CLOCK is being depressed. At the instance when CLOCK button is detached, second unit is cut off and second reset is executed. However, when CLOCK is depressed once when Q'REC remaining time is displayed on the counter, it is restored to current time displaying where no second reset is executed.
   (3) As for START END, the mode concerned is maintained even if it is depressed once. However, it is restored to current time displaying if key operation is not done for more than 1 min.
   (4) Double depressing of the key is not permitted other than the case where time setting of the clock is made. Therefore, the device is not operated normally if double depressing of the key is attempted.
   (5) When timer IC doesn't work correctly, reset it by applying +5V temporarily to No.5 pin or by disconnecting AC cord and connecting it again after more than 10 sec.

Description of PAL Power Circuit

1. **Operation**
   (1) After AC cord is connected, ALL +12V and the voltage of timer concerned are made available. ALL +12V is supplied to the system controller, timer and RF converter. This status is continued when FUNCTION switch is OFF and the timer is ON where timer display and the output form ANT to TV of RF converter are output.
   (2) When FUNCTION switch is turned to ON or timer REC is started, P-ON +15V are output by the control signal coming from the system controller.
   (3) Power supply for tuner selection is made by +32V which utilized Zener IC in order to reduce changes due to temperature variation.
   (4) –25V is the voltage for timer display.
   (5) F supplies filament voltage of AC 3.0V to display tube.
   The potential with regard to GND of this output becomes approx. –20V.
2. Cautional Items for MODEL with AC Voltage selection
   (1) The models equipped with voltage selection switch at primary side, D66 Z1033 and D667 RD33F are added which are short-circuited to open F651 and F652 for the sake of protection of internal circuits in the event higher voltage is applied erroneously while the switch is located at lower voltage. Therefore, if such a defect is noticed, check D666, 667, F651 and 652 and if they are defective, replace them without fail.

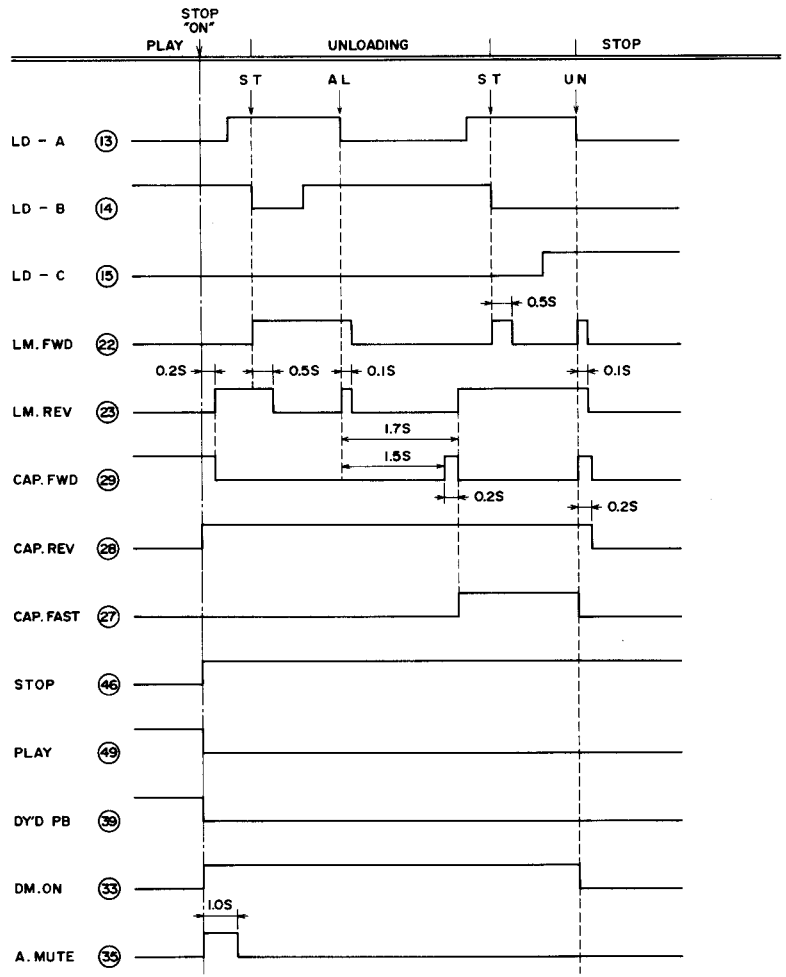
6.4. SYSTEM CONTROL TIMING CHART

6.4.1 STOP → PLAY → PAUSE → N.CANCEL → PLAY



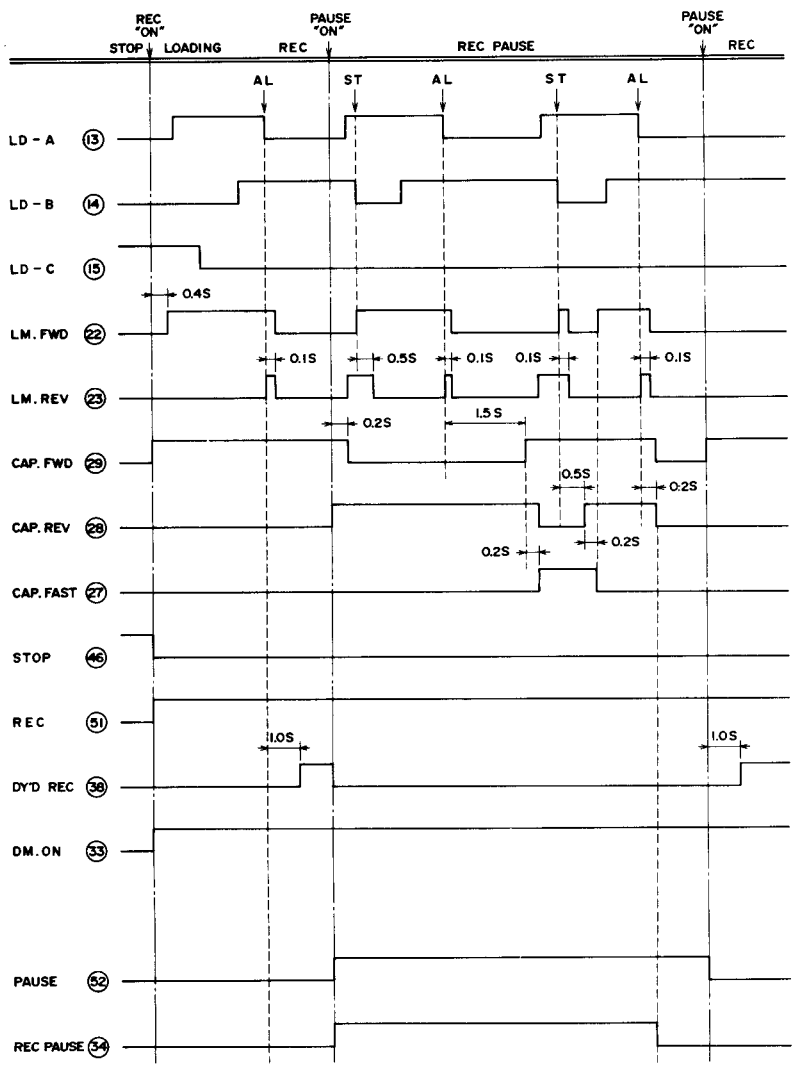
6.4. SYSTEM CONTROL TIMING CHART

6.4.2 PLAY → STOP



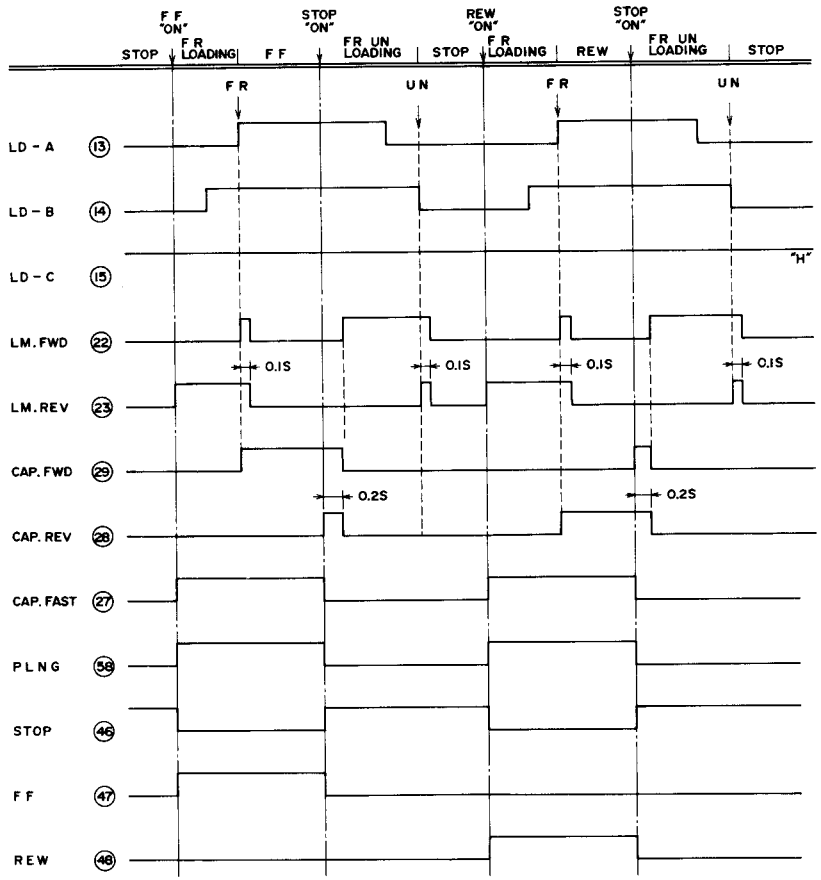
6.4. SYSTEM CONTROL TIMING CHART

6.4.3 STOP → REC → REC PAUSE → REC



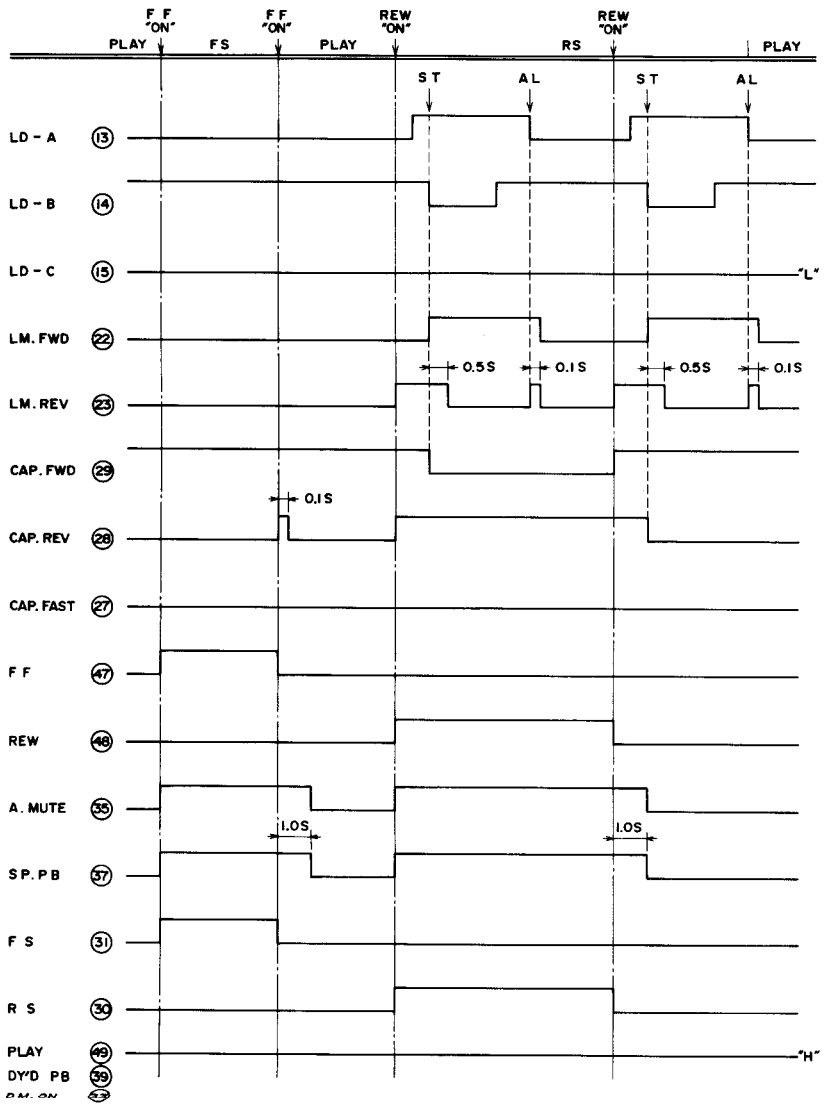
6.4. SYSTEM CONTROL TIMING CHART

6.4.4 STOP → F F → STOP → REW → STOP



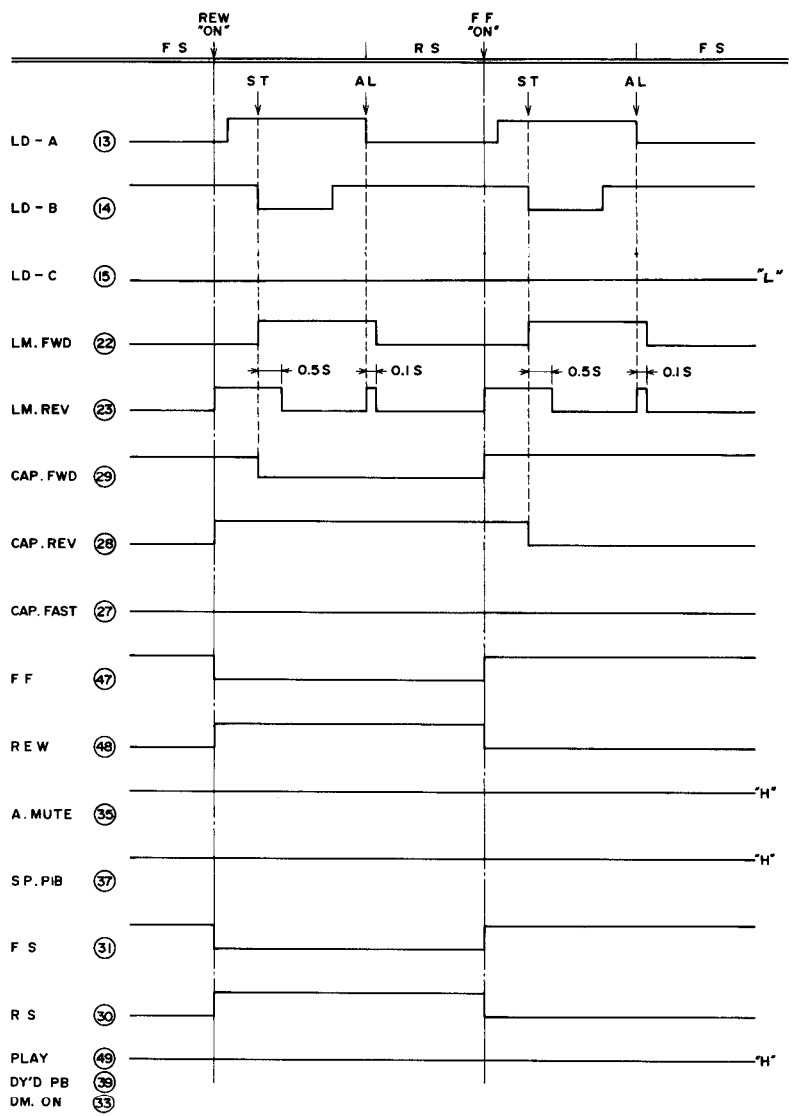
6.4. SYSTEM CONTROL TIMING CHART

6.4.5 PLAY → FS → PLAY → RS → PLAY



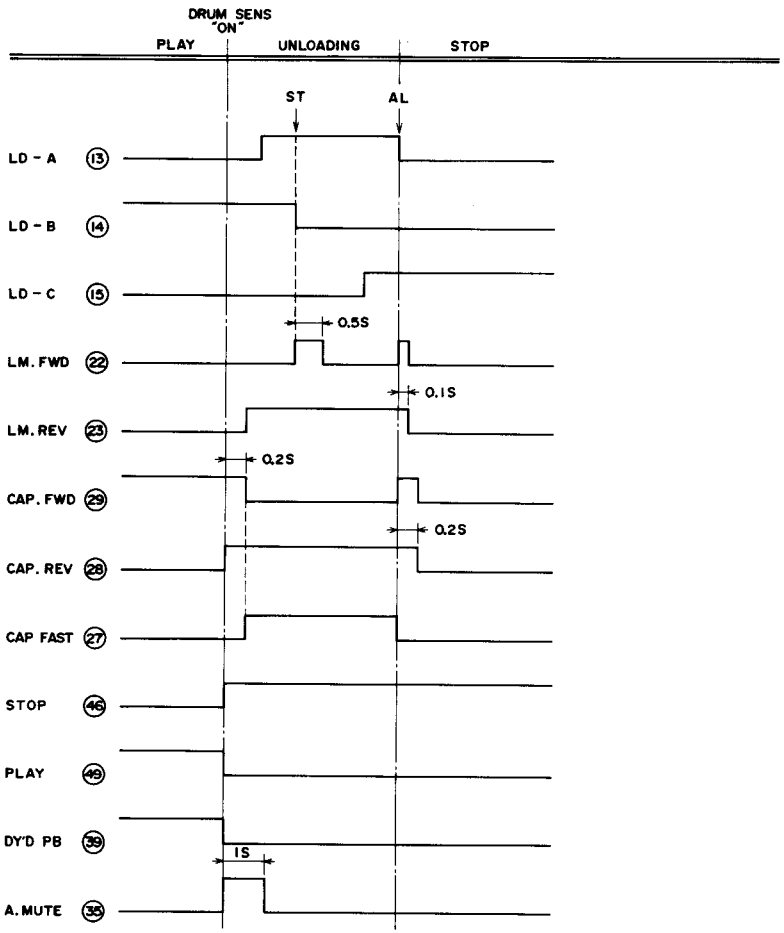
6.4. SYSTEM CONTROL TIMING CHART

6.4.6 FS → RS → FS



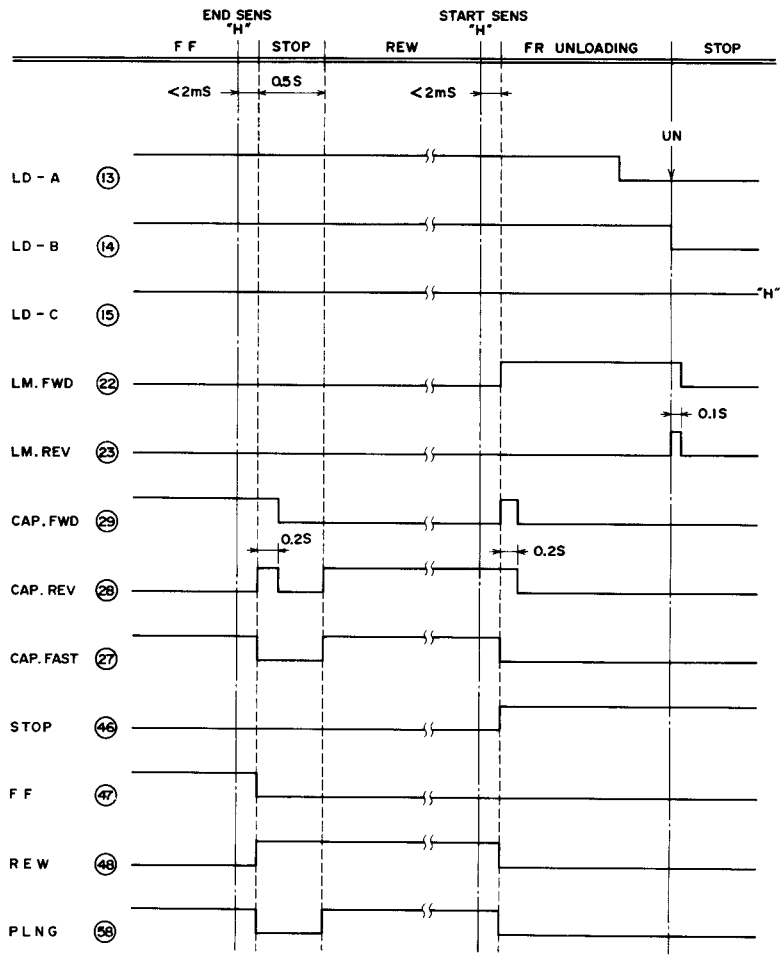
6.4. SYSTEM CONTROL TIMING CHART

6.4.7 DRUM SENS



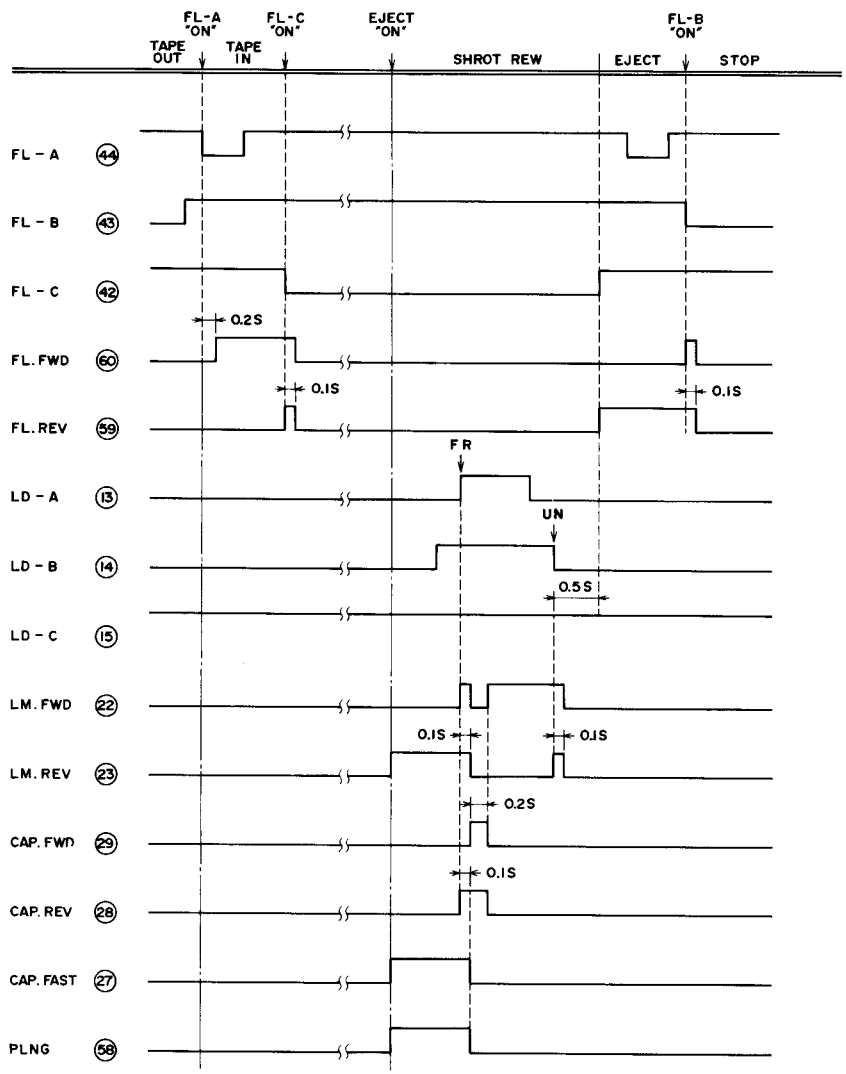
6.4. SYSTEM CONTROL TIMING CHART

6.4.8 FF → END.SENS → REW → ST.SENS → STOP

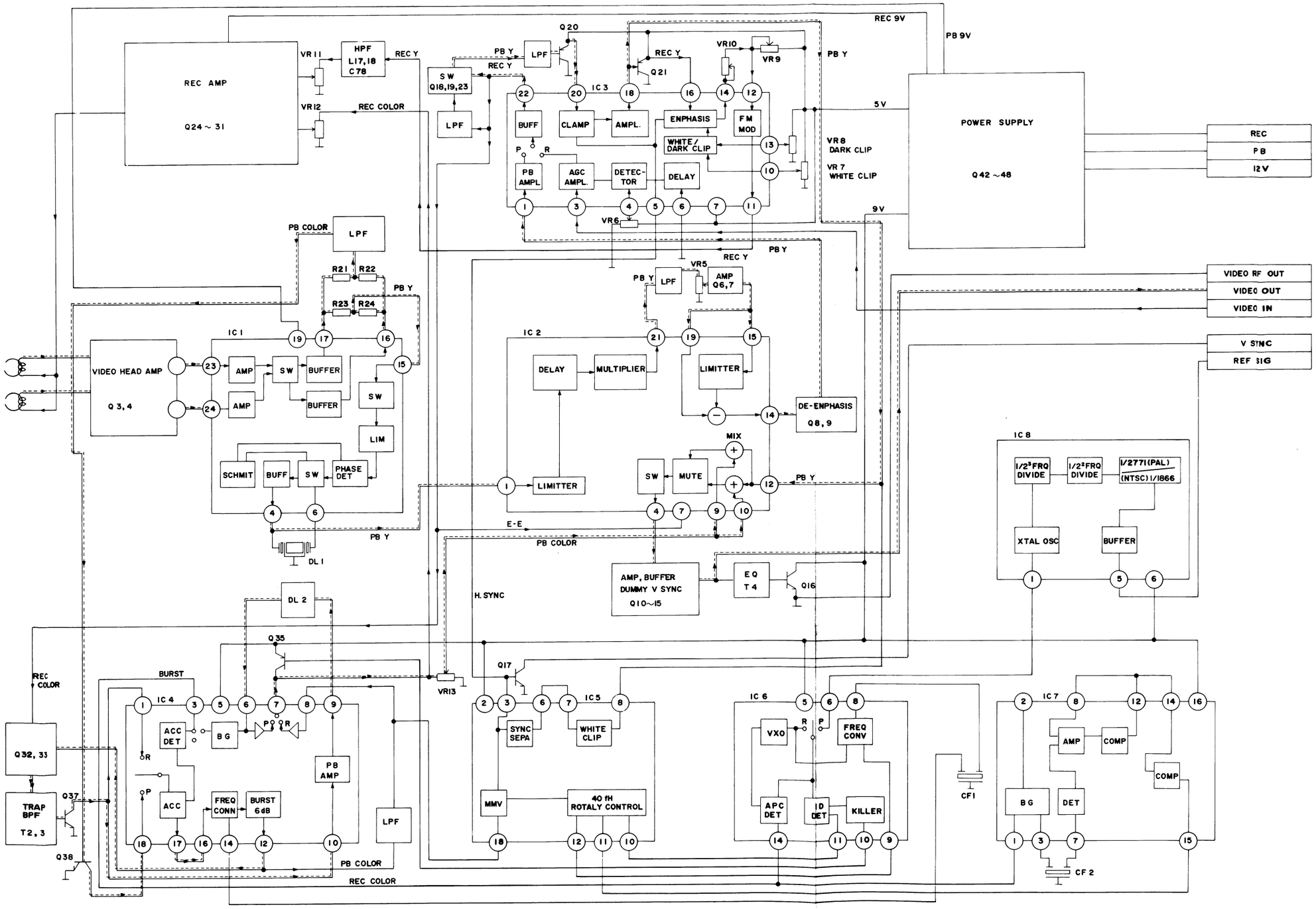


6.4. SYSTEM CONTROL TIMING CHART

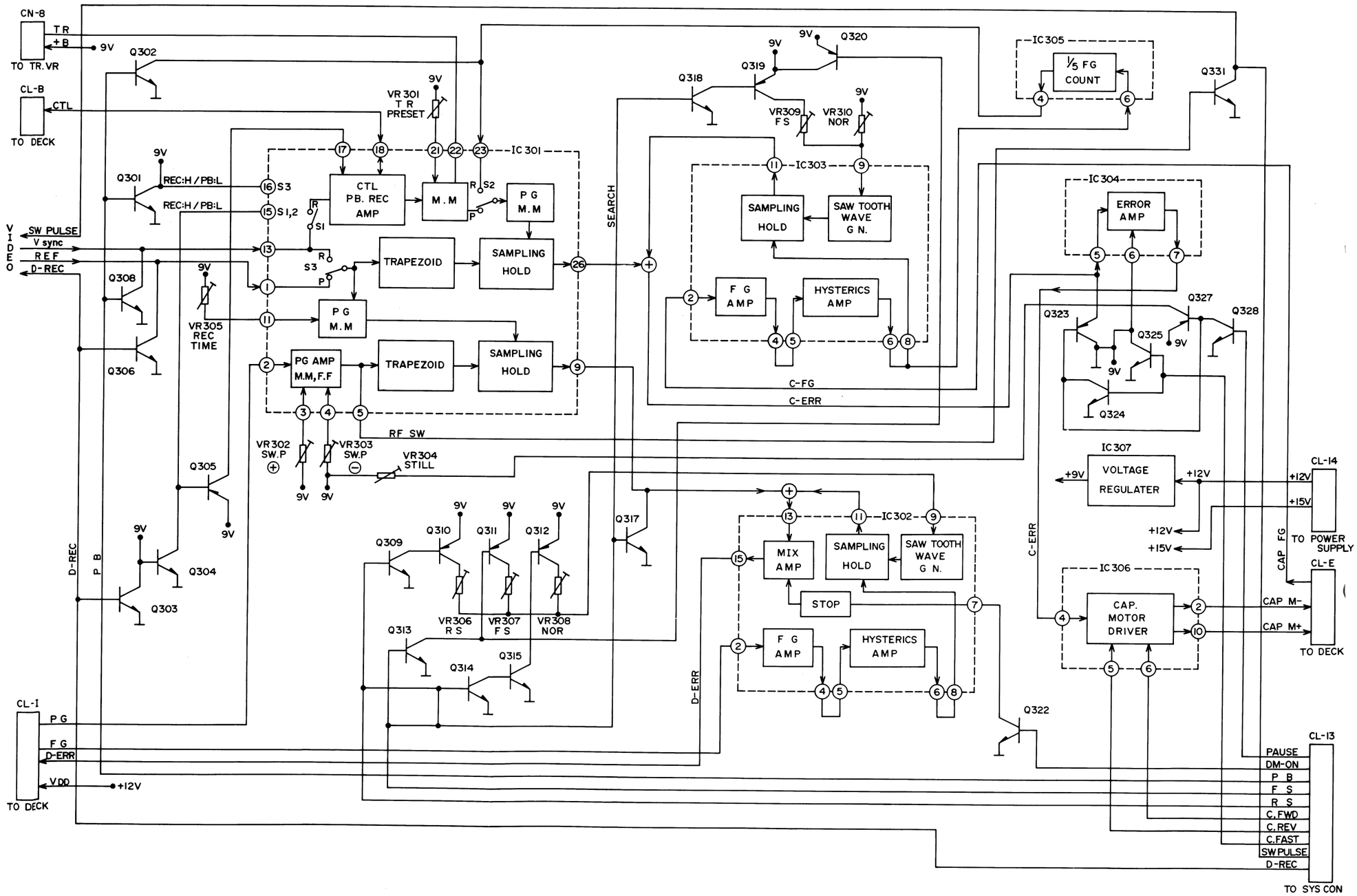
6.4.9 TAPE IN. EJECT



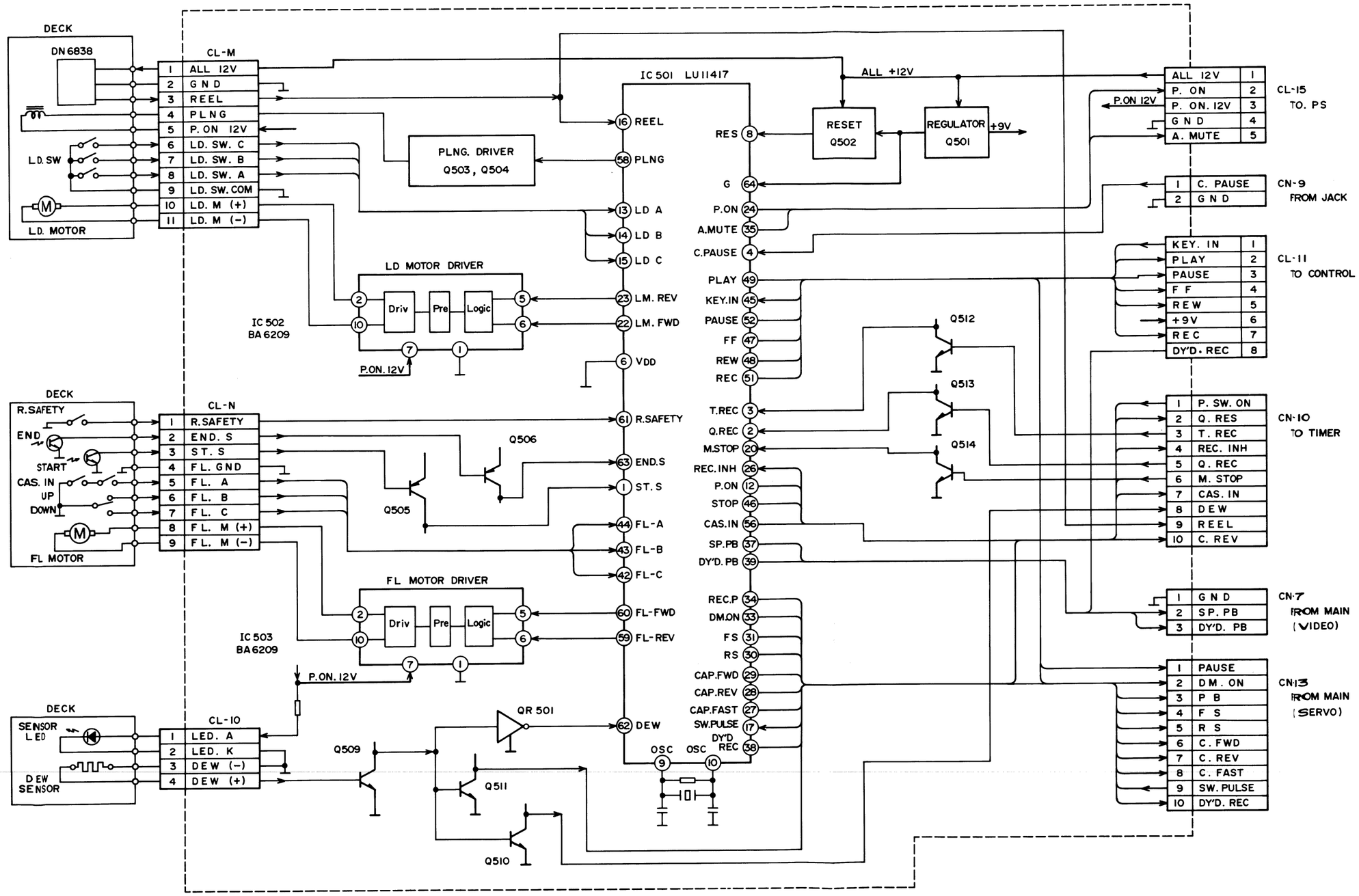
BLOCK DIAGRAM (Video Circuit)



BLOCK DIAGRAM (Servo)



BLOCK DIAGRAM (System Control)



Electrical Adjustment

PREPARATION

Electrical adjustments are required after replacing circuit components and certain mechanical parts. It is important to perform these adjustments only after all repairs and replacements have been completed. Also, do not attempt these adjustments unless the proper equipment is available.

Required test equipment

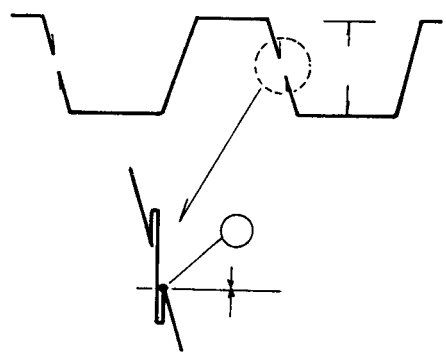
1. Digital voltmeter
2. Oscilloscope: Wide-band, Dual-trace 20 MHz.
3. Frequency counter.
4. Color Monitor Television
5. Test tape: F8A, J, M, F, H

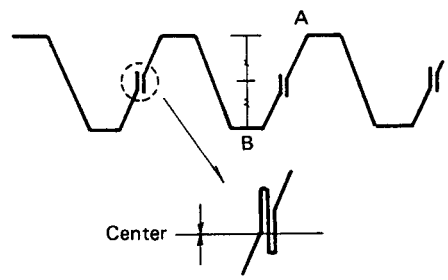
NOTE: Be sure to first check for smooth and proper tape transport before using the alignment tape.

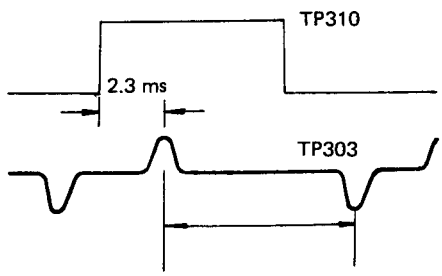
Alignment Tape Contents

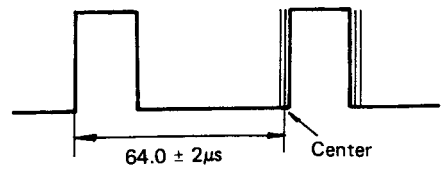
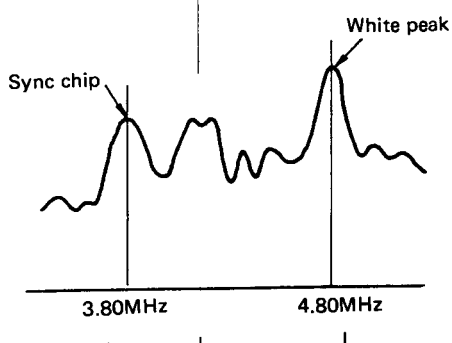
Ref. No.	Video Signal	Audio Signal	Applications
F8J	Strairstep	1 kHz 200 kHz 8 kHz	• Audio Frequency Responce
F8M	Mono Scope	3 kHz –20dB	• Resolution Check • Wow and Flutter Checks • Picture Quality Check
F8A	Color Bar	1 kHz (0dB)	• Y-level Adjustment • C-level Adjustment • Audio Level Check
F8F	RF Sweep	(none)	• RF Frequency Responce Adjustment • D.O.C. Sense
F8H	4.7MHz	(none)	• Video Head Resonance Adjustment

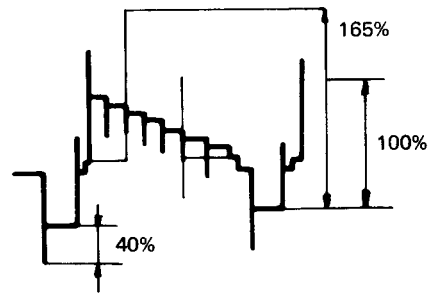
ADJUSTMENT (SERVO/VIDEO)

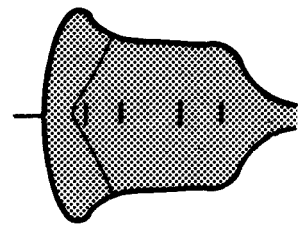
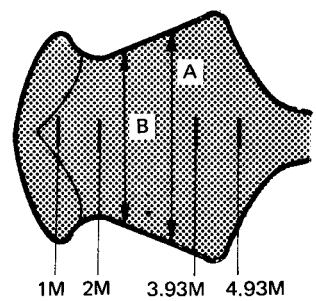
No.	Adjustment Item	Test Point	Adjustment Point	Usage Tape	Adjustment	Equipment Connection
V-5	X'tal OSC Alignment * E-E mode Color bar with 100% white	TP18	VC4		a. Connect frequency counter to TP18. b. Adjust VC4 very slowly until counter indicates 4.433618MHz ± 10Hz.	 Fig. 1
S-1	Drum Servo (Speed & Phase)	TP310 TP306 TP307 TP304 TP311 (GND)	VR308	(Color bar F6-A)	a. Connect EXT. TRIGGER input of oscilloscope to TP310 and TP311 (GND). b. Switch oscilloscope mode to DC/CH1 and trigger source to EXT. TRIGGER. Set VERTICAL GAIN to 500 mV/div. and connect CH1 prove to TP306. c. Reconnect to TP307 from CH1 and adjust VR308 to make voltage differences within ± 50mV compaire with previously checked at TP306. d. Reconnect to TP304 from CH1 confirm A point to lock in approx. center of trapezoid wave form as shown in Fig. 	 Fig. 5

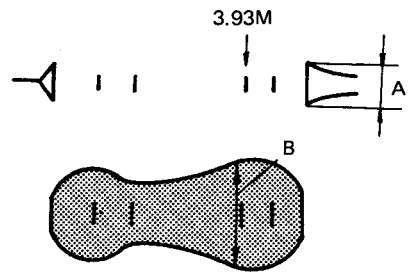
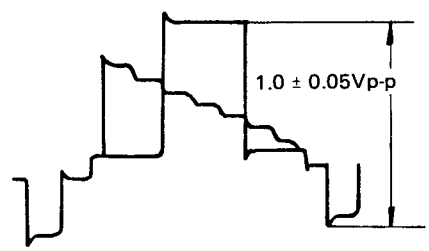
No.	Adjustment Item	Test Point	Adjustment Point	Usage Tape	Adjustment	Equipment Connection
S-2	Capstan Servo (Speed & Phase)	TP310 TP302 TP311 (GND)	VR310	(Color bar F6-A)	a. Connect EXT. TRIGGER input of oscilloscope to TP310 and TP311 (GND). b. Switch oscilloscope mode to CH1 and trigger source to EXT. connect CH1 prove to TP302. c. Playback test tape and adjust VR310 to stop sampling wave form between slop (A-B) as shown in Fig. 	Fig. 2
S-3	Tracking Volume Pre-set Alignment	TP310 TP303 TP311 (GND)	VR301	(Color bar F6-A)	a. Connect EXT. TRIGGER input of oscilloscope to TP310 and TP311 (GND). b. Switch oscilloscope mode to CHOP. c. Connect oscilloscope to TP310 and CH2 prove to TP303. d. Set tracking volume to pre-set position (center click stop) and playback TEST Tape. e. On the scope will appear 2 different type of wave forms.	Fig. 3

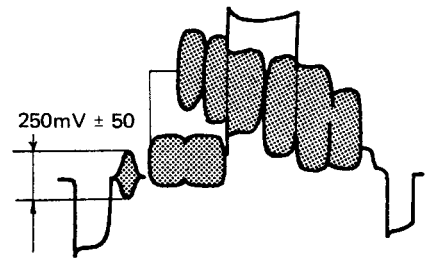
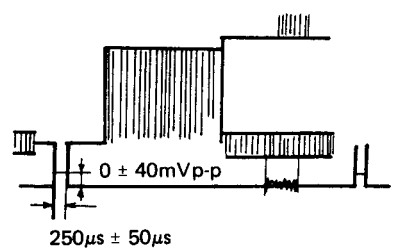


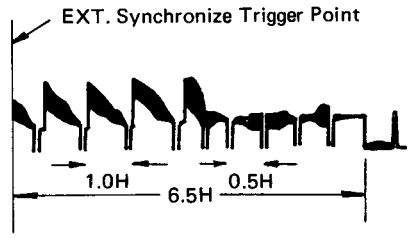
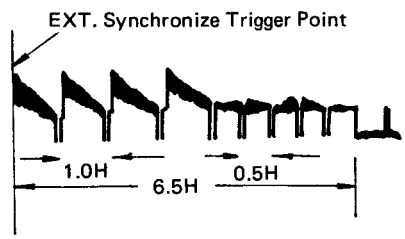
No.	Adjustment Item	Test Point	Adjustment Point	Usage Tape	Adjustment	Equipment Connection
V-1	AFC Alignment	TP14	VR14		a. Make no input with E-E mode. b. Connect oscilloscope to TP14 and adjust VR14 to make as illustrated in Fig. c. Input color bar signal and confirm to wave form as shown Fig. 	Fig. 11
V-2	E-E Output Alignment	TP7 TP15	VR6		a. Connect EXT. TRIGGER input of oscilloscope to TP15. b. Input White signal color bar to Video In. c. Ground 75 ohm to Video Output. d. Adjust VR6 to 1.0Vp-p ± 50Vp-p at TP7.	Fig. 6
V-3	Carrier Set/ Deviation Alignment * E-E mode 100% white input	TP19 TP12	VR9 VR10		a. Make turning VR8 fully counter-clockwise and make turning VR7 fully clockwise. b. Connect Spectro Anyrizer to TP12. Adjust VR9 to SYNC. chip 3.80MHz and adjust VR10 to White peak 4.80 MHz as shown Fig. 	Fig. 7

No.	Adjustment Item	Test Point	Adjustment Point	Usage Tape	Adjustment	Equipment Connection
V-4	White Clip/ Dark Clip Alignment * E-E mode Color bar with 100% white	TP11	VR7 VR8		a. Connect oscilloscope to TP11. b. Adjust VR7 to White clip level 165 ± 5%. Adjust VR8 to Dark clip level 40 ± 5%. 	Fig. 11
V-6	VXO Alignment * E-E mode Color bar with 100% white	TP19 TP17	VC3		a. Connect +9V to TP17. b. Connect Frequency counter to TP19 and adjust VC3 to 5.06057MHz ± 20Hz.	Fig.1
V-10	RF Frequency Response Alignment * PB mode	TP5 TP3 TP4	VR1 VR2 VR3 VC1 VC2	5.1MHz tape RF Sweep tape (F6H, F6F)	a. Turn VR1 and VR3 to counter clockwise fully. Set VR2 to center position. b. Connect oscilloscope CH1 to TP5 and EXT. TRIGGER to TP3. c. Playback the tape 5.1MHz and adjust tracking at best position.	Fig.9

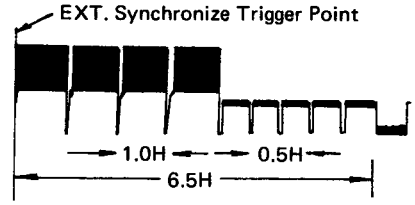
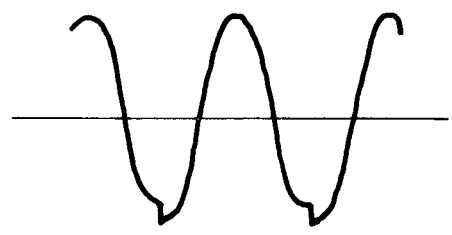
No.	Adjustment Item	Test Point	Adjustment Point	Usage Tape	Adjustment	Equipment Connection
					d. Adjust VC1 to make the level maximum position at + TRIGGER mode. e. Adjust VC2 to make the level maximum position at – TRIGGER mode. f. Adjust VR2 to make the same level 1 MHz for both channel at playback the TEST tape of RF Sweep.  g. Adjust VR1 to make 100% ± 5% for 3.92 M/2M at + TRIGGER mode. h. Adjust VR30 to make 110% ± 5% for 3.92 M/2M at – TRIGGER mode.  A/B x 100 = 110 ± 5	Fig. 9

No.	Adjustment Item	Test Point	Adjustment Point	Usage Tape	Adjustment	Equipment Connection
V-11	DOC Sensitivity Alignment * PB mode	TP3 TP4 TP5 TP6	VR4	RF Sweep tape (F6F)	a. Switch mode of Oscilloscope to ADD mode and connect EXT. TIRGGER input to TP3. b. Connect CH1 prove to TP5 and TP4 (GND) and CH2 prove to TP6. c. Turn VR4 to counter clockwise slowly.  A/B x 100 = 10 ± 3%	Fig. 10
V-12	Playback Y (Video) Level Alignment * PB mode	TP7 TP15	VR5	F6A tape	a. Connect TP15 to EXT. TRIGGER of oscilloscope. b. Terminated Video out with 75 ohm ± 1 ohm. c. Playback the color bar test tape. Adjust VR5 make Y output level 1.0 Vp-p ± 50 mVp-p as illustrated in Fig. 	Fig. 6

No.	Adjustment Item	Test Point	Adjustment Point	Usage Tape	Adjustment	Equipment Connection
V-13	Playback Color Level Alignment * PB mode	TP7	VR13	F6A tape	a. Connect oscilloscope to TP7. b. Playback Color bar test tape. Adjust VR13 to make burst level 250 mVp-p ± 50 mVp-p as illustrated in Fig.  	Fig. 6
V-14	Dummy VD Check * PB → STILL	TP7		F6A tape	a. Connect osilloscope to TP7. b. Confirm to inserting Dummy VD as illustrated in shown at STILL MODE.  	Fig. 6

No.	Adjustment Item	Test Point	Adjustment Point	Usage Tape	Adjustment	Equipment Connection
S-4	Switching Point Alignment	TP310 TP7 TP311 (GND)	VR302 VR303	(Color bar F6-A)	a. Connect EXT. TRIGGER input to TP310 and TP311 (GND). b. Switch oscilloscope mode to CHOP and connect CH1 prove to TP310 and CH2 prove to TP7. c. Adjust VR302 to make 6.5H from edge of V-SYNC on the scope CH2 (+ TRIGGER).  d. Adjust VR303 to make 6.5H from edge of V-SYNC on the scope (– TRIGGER).  	Fig. 3
S-5	STILL Alignment		VR304	(Color bar F6-A)	a. Playback test tape. b. Push still button and make noise bar on TV screen. (Set wider noise bar in Upper TV screen). c. Adjust VR304 to make minimum drift in vertical direction. (Check with center portion of horizontal line.)	Fig. 4

No.	Adjustment Item	Test Point	Adjustment Point	Usage Tape	Adjustment	Equipment Connection
S-6	Cue/Rev. Alingment		VR306	(Color bar F6-A)	a. Adjust VR307 to minimize the fluctuation of the picture on the screen at Cue mode. b. Adjust VR306 to make 2 lines noise bar moving down slowly to bottom from top the screen. c. Adjust VR309 to make 2 lines noise bar moving down slowly to bottom from top the screen. d. Check to 3 lines noise bar moving slowly at Rev. mode.	Fig. 4
S-7	Cue/Rev. (Color Phase) Alignment		VR306 VR307	(Color bar F6-A)	a. Playback the tape and make Cue Mode. b. Adjust VR307 to matching Y color phase(without off color bar). c. Playback the tape and make Rev. mode. d. Adjust VR306 to matching Y color phase (without off color bar).	Fig. 4
S-8	REC Timing Alignment	TP310 TP7 TP311 (GND)	VR305	Black tape	a. Connect oscilloscope EXT. TRIGGER to TP310 & TP311 (GND). b. Switch oscilloscope mode to CHOP and connect CH1 prove to TP301 and CH2 prove to TP7. c. Input Video Signal and make in REC. mode.	Fig. 3

No.	Adjustment Item	Test Point	Adjustment Point	Usage Tape	Adjustment	Equipment Connection
					d. Adjust VR305 to make 6.5H (V-sync.) on CH2 at + TRIGGER EXT. Sync..  Note: After dajutment an above, check S-3 (Tracking Volume Pre-set alignment). If it is off adjustment.	
V-7	Rec. Current Alignment * REC mode Color bar with 100% white	TP1 TP2	VR11 VR12		a. Turn VR11 to counter clockwise fully. b. Connect oscilloscope to TP11. c. Adjust VR12 to Chroma level 33 mVp-p. d. Adjust VR11 to V-sync. level 130 mVp-p.	Fig. 11
V-8	* SECAM 1/2fH Tune * E-E mode SECAM Color bar	TP16 TP20	L29		a. Connect oscilloscope CH1 to TP20 and TP16 (GND). b. Adjust L29 to make maximum level of 1/2 Fh.. 	Fig. 8

ALIGNMENT INSTRUCTIONS

AUDIO ALIGNMENT

NO.	Adjustment item	Test point	Adjustment Point	Connection	Adjustment
	Audio PC Ouput Level Test tape Ref. No. F6A (1KHz 0 dB) Mode: Play	Audio out	VR702	Fig. 00	a. Connect Oscilloscope and AC mVolt meter to Audio Output terminal.
					b. Playback the test tape.
					c. Confirm to output signal of 1 KHz Sine wave with Oscilloscope.
					d. Adjust VR702 until AC mVolt meter indicates minus 4 dB.
	Bias Current Mode: Record	TP701 TP702	VR701	Fig. 00	a. Connect AC mVolt meter to TP701 and TP702.
					b. Insert short-pin to Audio-In terminal then set in Record mode.
					c. Adjust VR701 until AC mVolt meter indicates 3.4mV.

EQUIPMENT CONNECTION (Audio)

FIG.

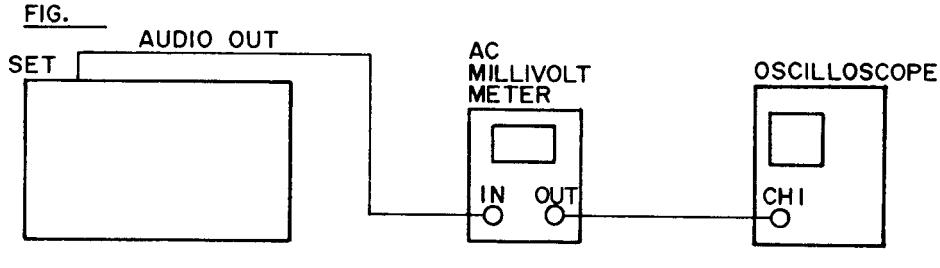
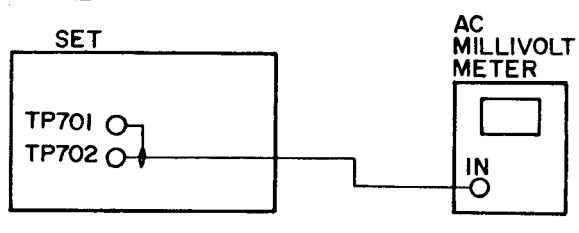
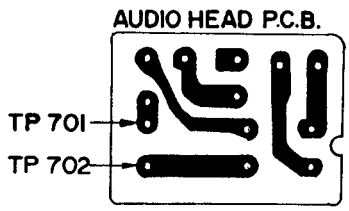


FIG.





EQUIPMENT CONNECTION (Video & Servo)

FIG. 1

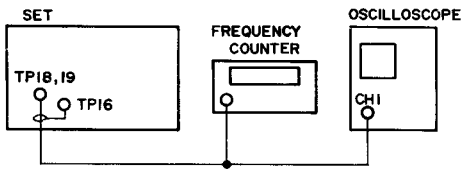


FIG. 2

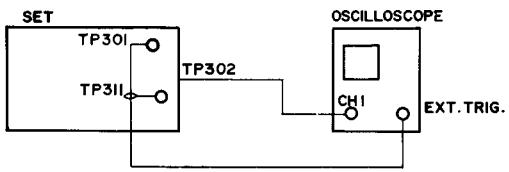


FIG. 3

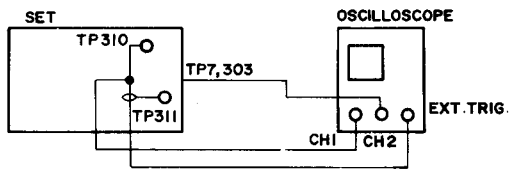


FIG. 4

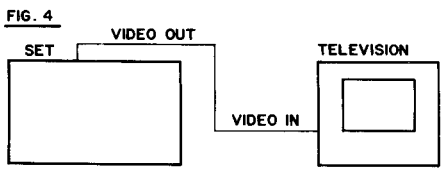


FIG. 5

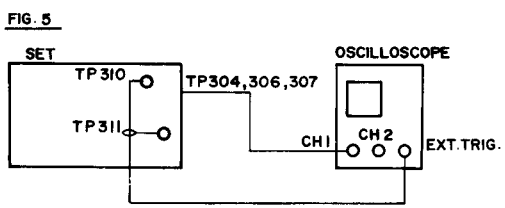


FIG. 6

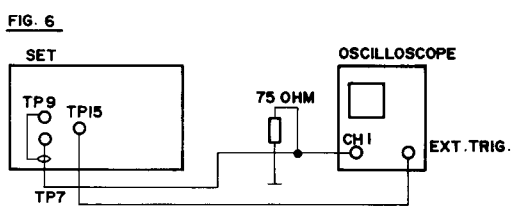


FIG. 7

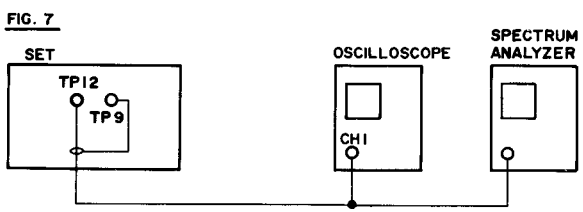


FIG. 8

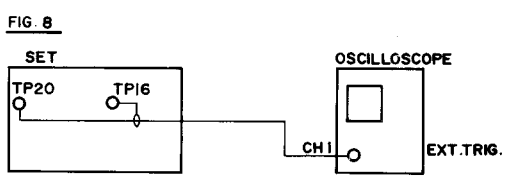


FIG. 9

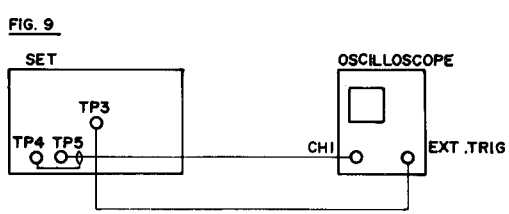


FIG. 10

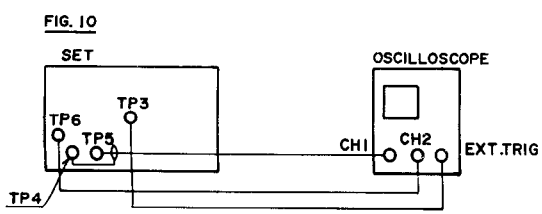
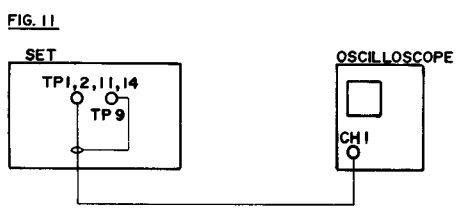
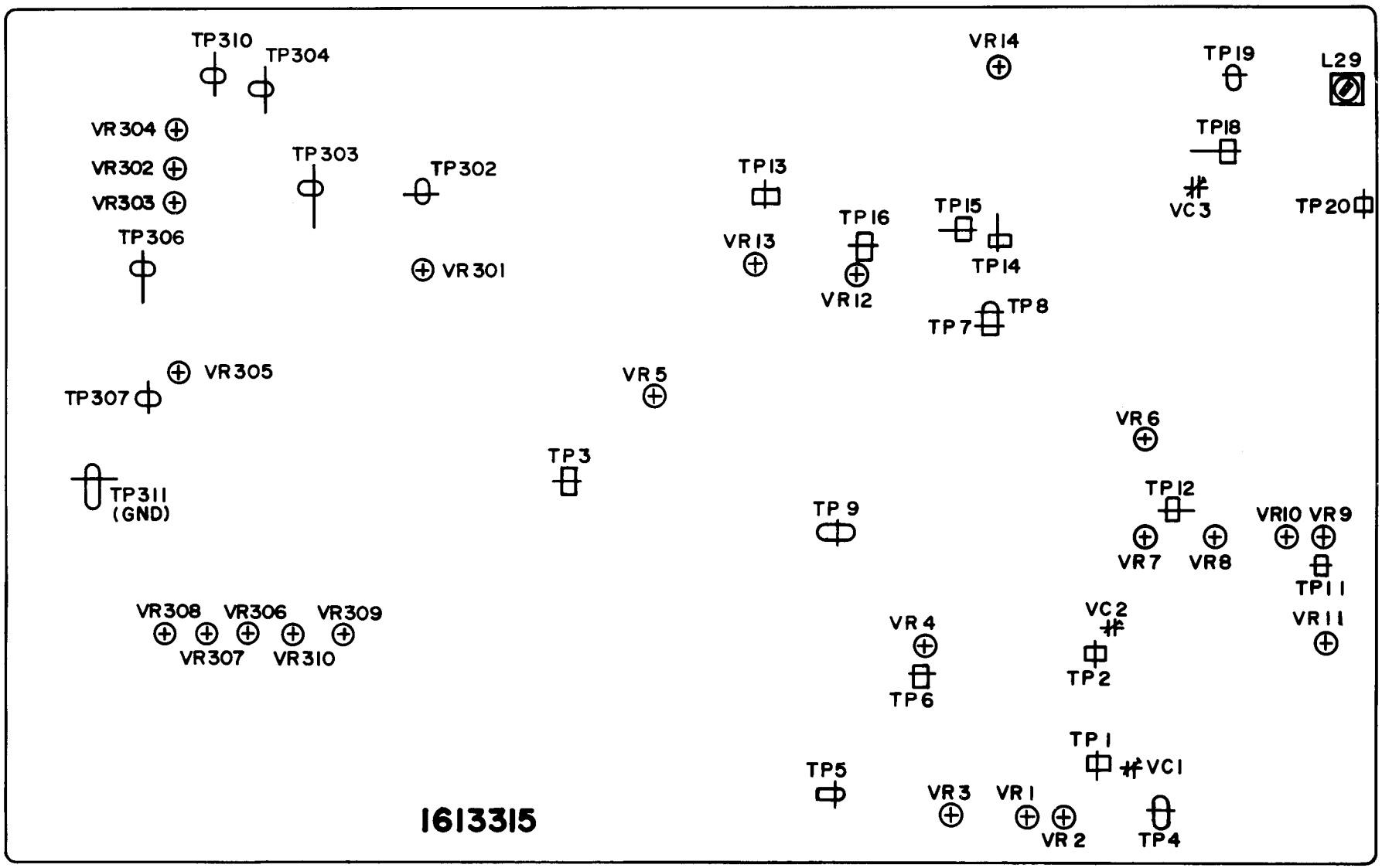


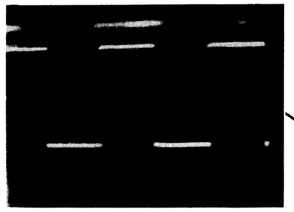
FIG. 11

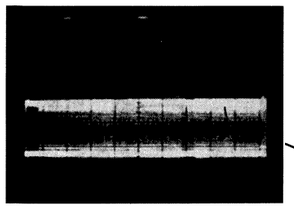


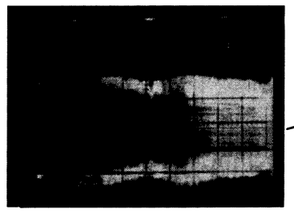
ALIGNMENT POINT AND TEST POINT

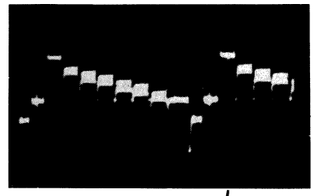


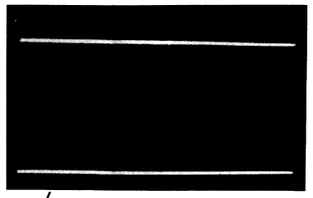
SCHEMATIC DIAGRAM (Main)

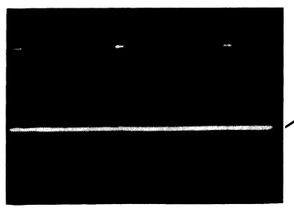


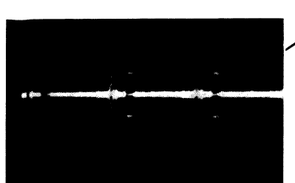


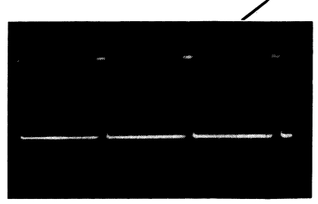


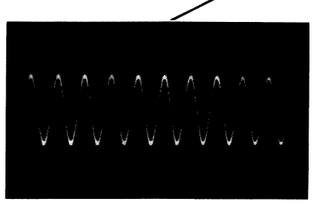


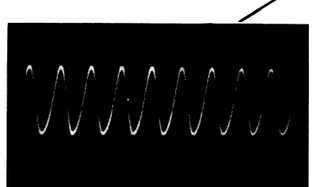


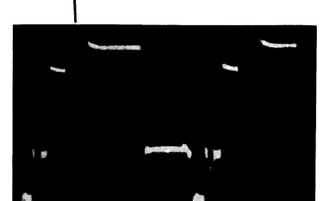




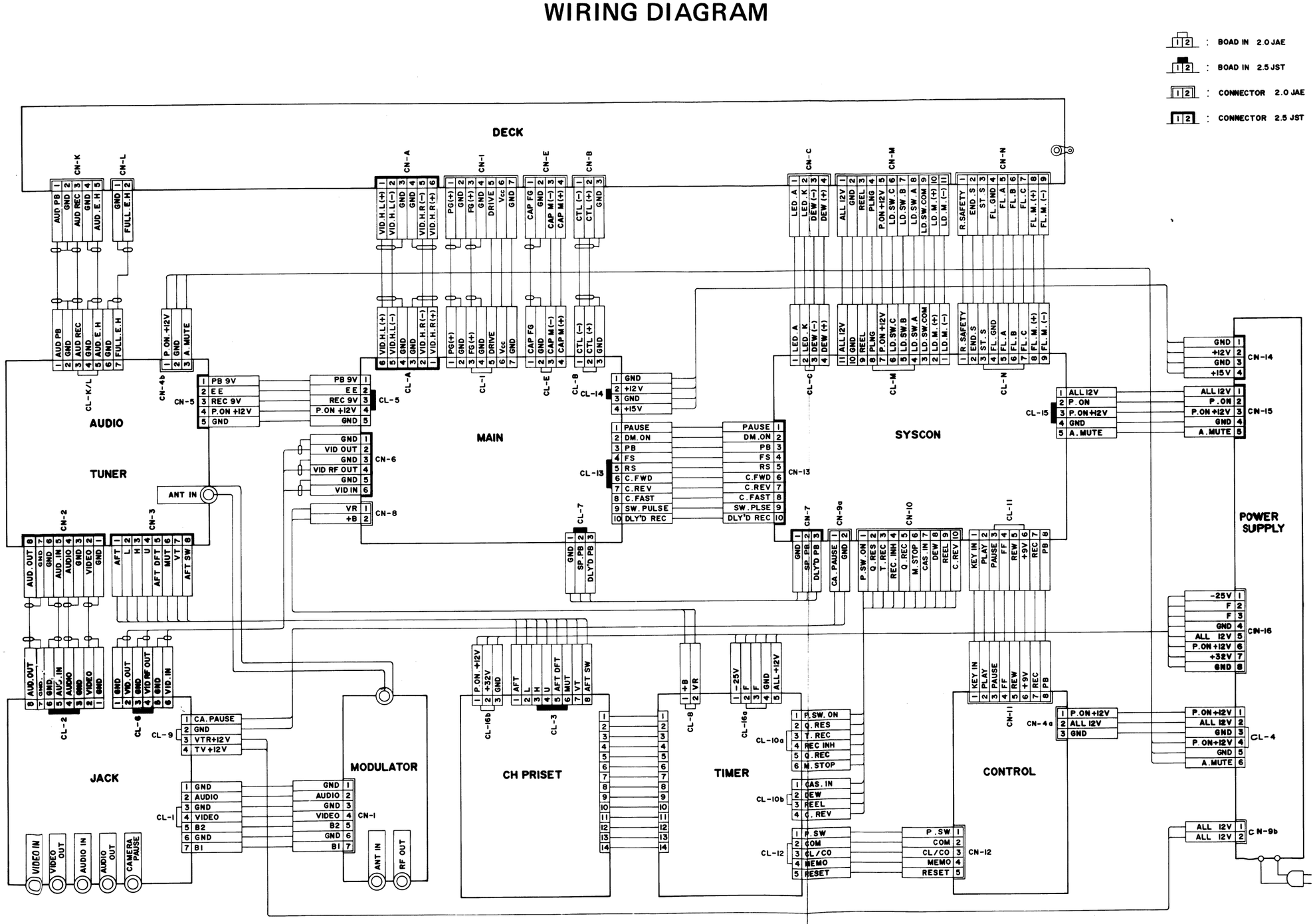








WIRING DIAGRAM



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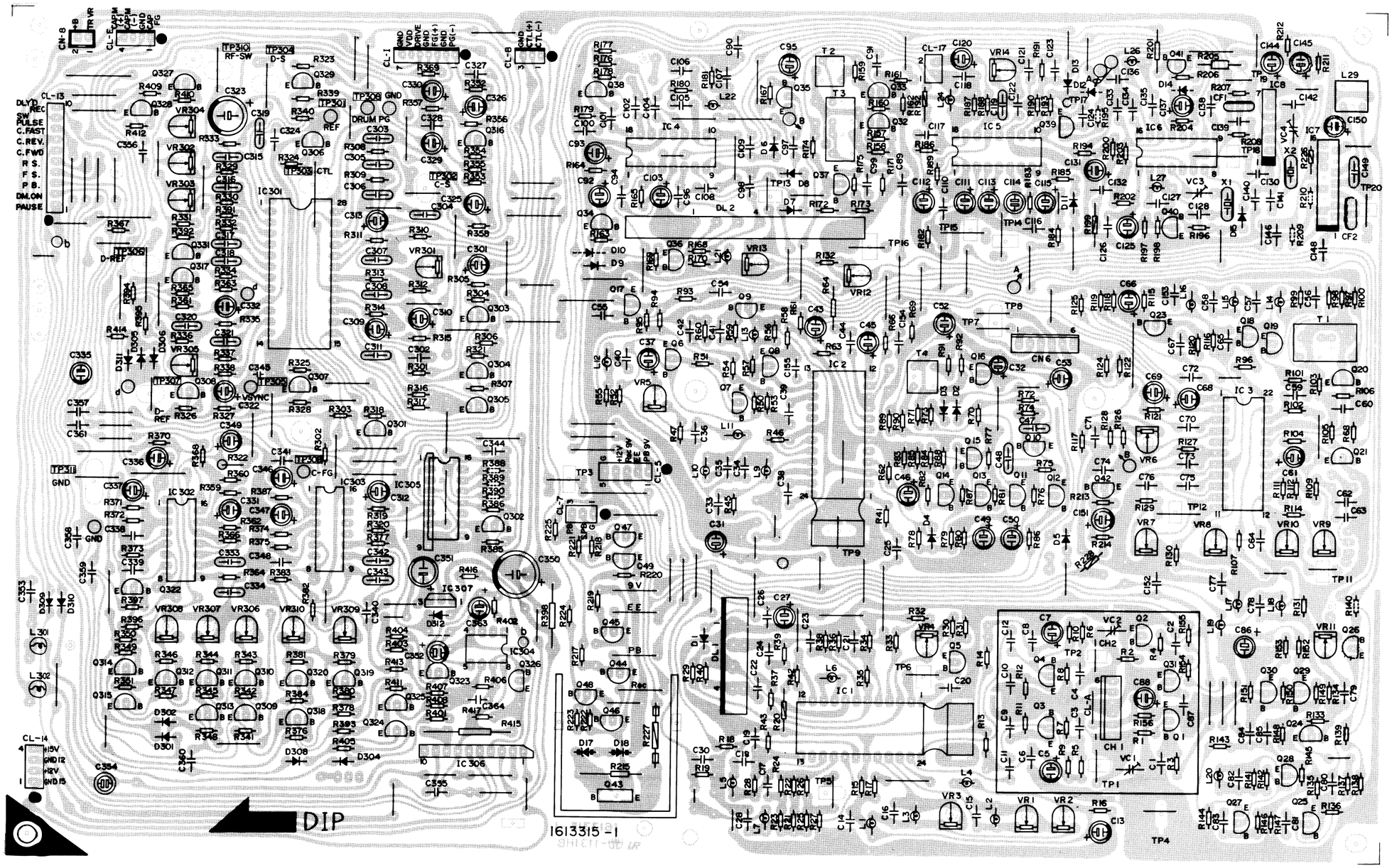
MAIN P.C.Board (Video & Servo) Top View



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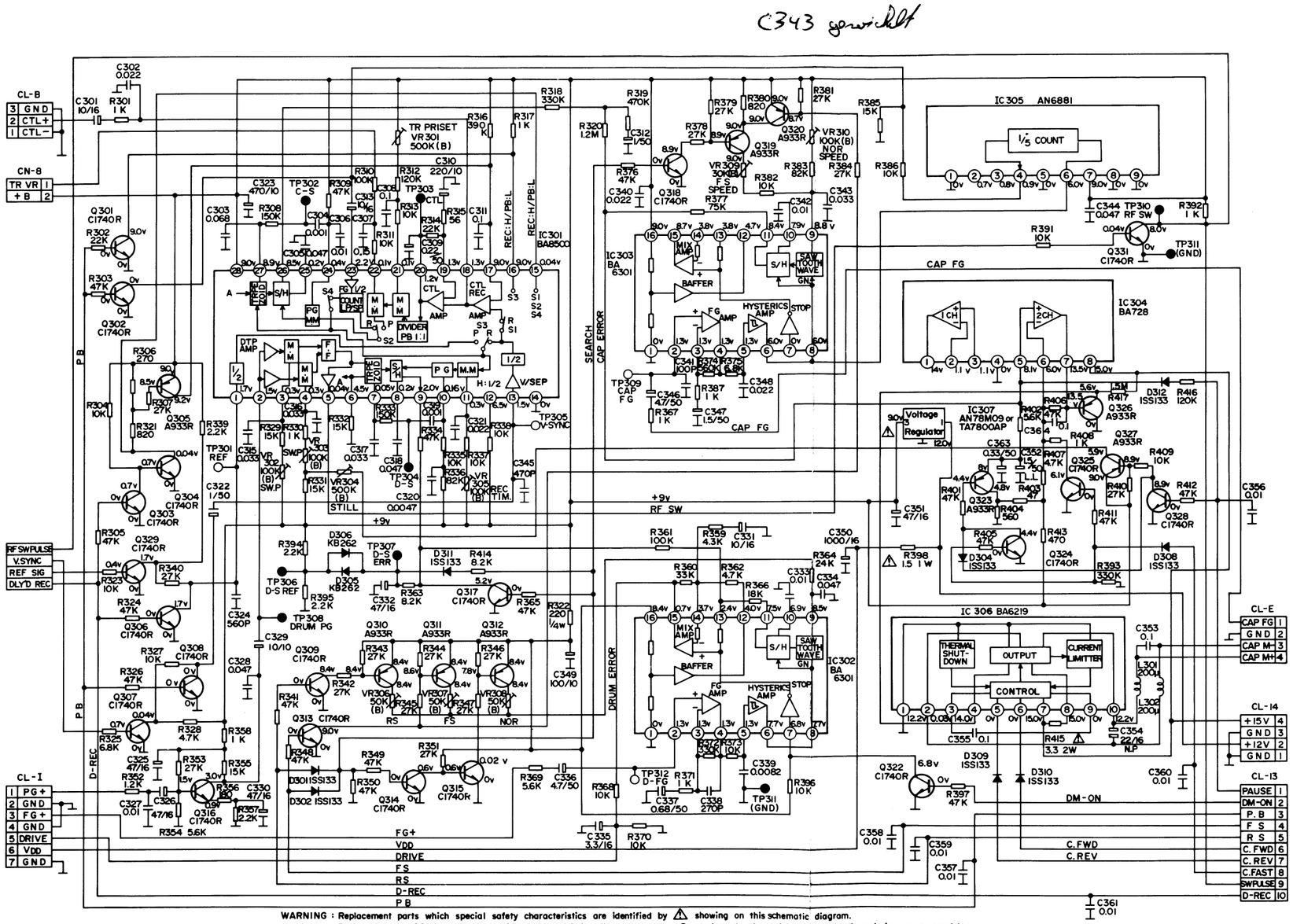
SCHEMATIC DIAGRAM (Servo)



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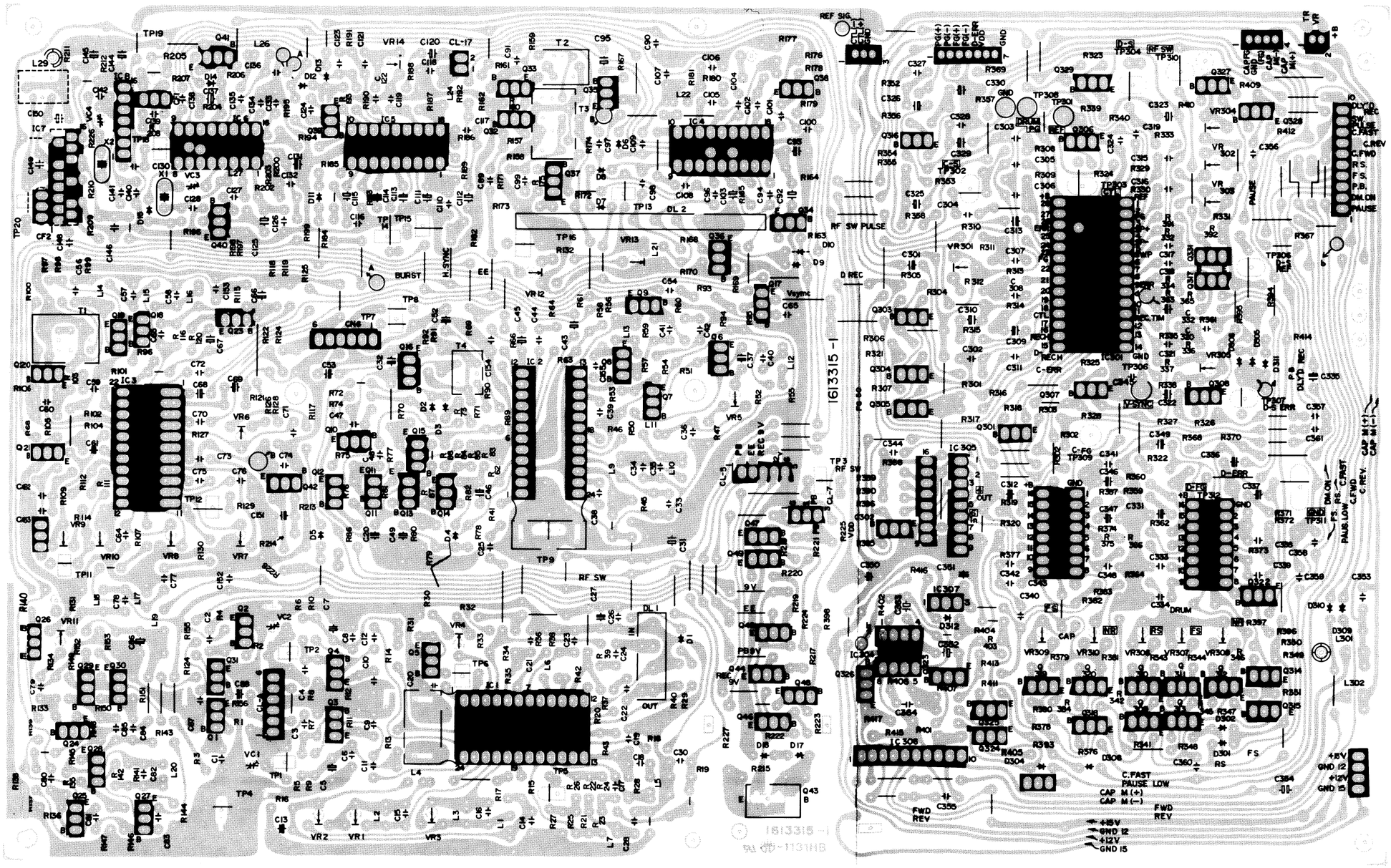
Ref. No.	Description	Parts No.
	COILS	
L1	Coil, Filter 1mH	117D465
L2	Coil, Filer 15μH (LF-7.5)	2162150
L3	Coil, Filter 15μH (LF-7.5)	2162150
L4	Coil, Filter 1mH	117D465
L5	Coil, Filter 47μH (LF-7.5)	2162470
L6	Coil, Filter 1mH	117D465
L7	Coil, Filter 220μH (LF-7.5)	2162221
L8		
L9	Coil, Filter 120μH (LF-7.5)	2162121
L10	Coil, Filter 180μH (LF-7.5)	2162181
L11	Coil, Filter 120μH (LF-7.5)	2162121
L12	Coil, Filter 47μH (LF-7.5)	2162470
L13	Coil, Filter 180μH (LF-7.5)	2162181
L14	Coil, Filter 100μH (LF-7.5)	2162101
L15	Coil, Filter 150μH (LF-7.5)	2162151
L16	Coil, Filter 120μH (LF-7.5)	2162121
L17	Coil, Filter 56μH (LF-7.5)	2162560
L18	Coil, Filter 220μH (LF-7.5)	2162221
L19	Coil, Filter 100μH (LF-7.5)	2162101
L20	Coil, Filter 82μH (LF-7.5)	2162820
L21	Coil, Filter 15μH (LF-7.5)	2162150
L22	Coil, Filter 220μH (LF-7.5)	2162221
L23		
L24	Coil, Filter 5.6mH	117D466
L25		
L26	Coil, Filter 47μH (LF-7.5)	2162470
L27	Coil, Filter 56μH (LF-7.5)	2162560
L28		
L29	Coil, Filter 3.9mH	113D575
L30	Coil, Filter 150μH (LF-7.5)	2162151
L301	Coil, Choke	117B441
L302	Coil, Choke	117B441
	ICS	
IC1	IC CX134	14L0063
IC2	IC CX135	14L0064
IC3	IC AN6306	14L0100
IC4	IC AN6360	14L0065
IC5	IC AN6362	14LN067
IC6	IC AN6371	14LN066
IC7	IC BA7007	
IC8	IC AN6342N	14LN070
IC301	IC BA8500	14L0102
IC302	IC BA6301	14L0103
IC303	IC BA6301	14L0103
IC304	IC BA728	BA728
IC305	IC AN6881	14DN118
IC306	IC BA6219	14L0104
IC307	IC Regulater, 3 Terminal	AN78M09 or TA78009AP
	TRANSISTORS	
Q1	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q2	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q3	Transistor, 2SC535 (B)	C535B
Q4	Transistor, 2SC535 (B)	C535B
Q5	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q6	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q7	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q8	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q9	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q10	Transistor, 2SA933 (R or S)	A933 (RorS)
Q11	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q12	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q13	Transistor, 2SA933 (R or S)	A933 (RorS)
Q14	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q15	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q16	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q17	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q18	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q19	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q20	Transistor, 2SA933 (R or S)	A933 (RorS)
Q21	Transistor, 2SA933 (R or S)	A933 (RorS)
Q22		
Q23	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q24	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q25	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q26		
Q27	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q28	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q29	Transistor, 2SA933 (R or S)	A933 (RorS)
Q30	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q31	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q32	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q33	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q34	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q35	Transistor, 2SA933 (R or S)	A933 (RorS)
Q36	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q37	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q38	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q39		
Q40	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q41	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q42	Transistor, 2SC2060 (Q or R)	C2060 (QorR)
Q43	Transistor, 2SD1380 (P or Q)	D1380 (Por Q)
Q44	Transistor, 2SA854 (Q or R)	A854 (QorR)
Q45	Transistor, 2SA933 (R or S)	A933 (RorS)
Q46	Transistor, 2SA933 (R or S)	A933 (RorS)
Q47	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q48	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q49	Transistor, 2SA933 (R or S)	A933 (RorS)
Q301	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q302	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q303	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q304	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q305		
Q306	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q307	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q308	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q309	Transistor, 2SC1740 (R or S)	C1740 (RorS)
Q310		
Q311		
Q312		

MAIN P.C.Board (Video & Servo) Bottom View



Ref. No.	Description	Parts No.
Q313	Transistor, 2SC1740 (R or S)	C1740 (R or S)
Q314	Transistor, 2SC1740 (R or S)	C1740 (R or S)
Q315	Transistor, 2SC1740 (R or S)	C1740 (R or S)
Q316	Transistor, 2SC1740 (R or S)	C1740 (R or S)
Q317	Transistor, 2SC1740 (R or S)	C1740 (R or S)
Q318	Transistor, 2SC1740 (R or S)	C1740 (R or S)
Q319	Transistor, 2SA933 (R or S)	A933 (R or S)
Q320	Transistor, 2SA933 (R or S)	A933 (R or S)
Q321		
Q322	Transistor, 2SC1740 (R or S)	C1740 (R or S)
Q323	Transistor, 2SA933 (R or S)	A933 (R or S)
Q324	Transistor, 2SC1740 (R or S)	C1740 (R or S)
Q325	Transistor, 2SC1740 (R or S)	C1740 (R or S)
Q326	Transistor, 2SA933 (R or S)	A933 (R or S)
Q327	Transistor, 2SA933 (R or S)	A933 (R or S)
Q328	Transistor, 2SC1740 (R or S)	C1740 (R or S)
Q329	Transistor, 2SC1740 (R or S)	C1740 (R or S)
Q330		
Q331	Transistor, 2SC1740 (R or S)	C1740 (R or S)
	DIODES	
D1	Diode 1SS133	1SS133
D2	Diode 1SS133	1SS133
D3	Diode 1SS133	1SS133
D4	Diode 1SS133	1SS133
D5	Diode 1SS133	1SS133
D6	Diode 1SS133	1SS133
D7	Diode 1SS133	1SS133
D8	Diode 1SS133	1SS133
D9	Diode 1SS133	1SS133
D10		
D11	Diode 1SS133	1SS133
D12		
D13	Diode 1SS133	1SS133
D14		
D15	Diode 1SS133	1SS133
D16		
D17	Diode Zener MT29.1C or UZ9.1BH	MT29.1C or UZ9.1BH
D18	Diode 1SS133	1SS133
D301	Diode 1SS133	1SS133
D302	Diode 1SS133	1SS133
D303		
D304	Diode 1SS133	1SS133
D305	Diode Varister KB262	KB262
D306	Diode Varister KB262	KB262
D307		
D308	Diode 1SS133	1SS133
D309	Diode 1SS133	1SS133
D310	Diode 1SS133	1SS133
D311	Diode 1SS133	1SS133
D312	Diode 1SS133	1SS133

Ref. No.	Description	Parts No.
	CAPACITORS	
C1	Cap. Ceramic 0.022μF, Z	12F3223
C2	Cap. Ceramic 0.022μF, Z	12F3223
C3	Cap. Ceramic 0.01μF, Z	12F3103
C4	Cap. Ceramic 0.01μF, Z	12F3103
C5	Cap. Electrolytic 10μF/16V	126C106
C6	Cap. Ceramic 0.047μF, Z	12F3473
C7	Cap. Electrolytic 10μF/16V	126C106
C8	Cap. Ceramic 0.047μF, Z	12F3473
C9	Cap. Ceramic 0.022μF, Z	12F3223
C10	Cap. Ceramic 0.022μF, Z	12F3223
C11	Cap. Ceramic 0.01μF, Z	12F3103
C12	Cap. Ceramic 0.01μF, Z	12F3103
C13	Cap. Electrolytic 10μF/10V	126B106
C14	Cap. Ceramic 0.022μF, Z	12F3223
C15	Cap. Ceramic 68pF, J, SL	1270680
C16	Cap. Ceramic 68pF, J, SL	1270680
C17	Cap. Ceramic 56pF, J, SL	1270560
C18	Cap. Ceramic 8pF, J. SL	1270809
C19	Cap. Ceramic 0.022μF, Z	12F3223
C20	Cap. Ceramic 0.022μF, Z	12F3223
C21	Cap. Ceramic 0.022μF, Z	12F3223
C22		
C23	Cap. Ceramic 330pF, J, SL	1270331
C24	Cap. Ceramic 0.01μF, Z	12F3103
C25	Cap. Ceramic 27pF, J, SL	1270270
C26	Cap. Ceramic 0.022μF, Z	12F3223
C27	Cap. Electrolytic 33μF/16V	126C336
C28	Cap. Ceramic 100pF, J, SL	1270101
C29		
C30	Cap. Ceramic 100pF, J, SL	1270101
C31	Cap. Electrolytic 10μF/16V	126C106
C32	Cap. Electrolytic 33μF/16V	126C336
C33	Cap. Ceramic 12pF, J, SL	1270510
C34	Cap. Ceramic 51pF, J, SL	1270510
C35	Cap. Ceramic 51pF, J, SL	1270510
C36	Cap. Ceramic 21pF, J, SL	1270120
C37	Cap. Electrolytic 33μF/10V	126B336
C38	Cap. Ceramic 150pF, J, CH, NPO	12CH151
C39	Cap. Ceramic 270pF, J, SL	1270271
C40	Cap. Ceramic 120pF, J, SL	1270121
C41	Cap. Ceramic 330pF, J, SL	1270331
C42	Cap. Ceramic 270pF, J, SL	1270271
C43	Cap. Electrolytic 33μF/10V	126B336
C44	Cap. Ceramic 0.01μF, Z	12F3103
C45	Cap. Electrolytic 33μF/10V	126B336
C46	Cap. Electrolytic 33μF/10V	126B336
C47	Cap. Mylar 0.001μF/50V, K	1250102
C48	Cap. Mylar 0.0033μF/50V, K	1250332
C49	Cap. Electrolytic 100μF/6.3V	126A107
C50	Cap. Electrolytic 33μF/10V	126B336
C51		
C52	Cap. Electrolytic 1000μF/6.3V	126A108
C53	Cap. Electrolytic 100μF/6.3V	126A107
C54	Cap. Semi-Conductor 0.22μF/25V, JV	1220461
C55	Cap. Semi-Conductor 0.056μF, YB	12YZ563
C56	Cap. Ceramic 10pF, J, SL	1270100
C57	Cap. Ceramic 47pF, J, SL	1270470
C58	Cap. Ceramic 47pF, J, SL	1270470

Ref. No.	Description	Parts No.
C59	Cap. Semi-Conductor 0.22μF/25V, JV	1220461
C60	Cap. Ceramic 15pF, J, SL	1270150
C61	Cap. Electrolytic 1μF/50V	126F105
C62	Cap. Ceramic 56pF, J, SL	1270560
C63	Cap. Ceramic 56pF, J, SL	1270560
C64	Cap. Ceramic 0.01μF, Z	12F3103
C65	Cap. Ceramic 10pF, J, SL	1270100
C66	Cap. Electrolytic 10μF/16V	126C106
C67	Cap. Electrolytic 33μF/10V	126B336
C68	Cap. Electrolytic 4.7μF/25V	126D475
C69	Cap. Electrolytic 23μF/10V	126B226
C70	Cap. Electrolytic 10μF/16V	126C106
C71	Cap. Ceramic 0.01μF, Z	12F3103
C72	Cap. Semi-Conductor 0.1μF/25V, JV	1220461
C73	Cap. Ceramic 120pF, J, SL	1270121
C74	Cap. Ceramic 0.022μF, Z	12F3223
C75	Cap. Ceramic 39pF, J, CH, NPO	12CH390
C76	Cap. Ceramic 0.01μF, Z	12F3103
C77	Cap. Ceramic 120pF, J, SL	1270121
C78	Cap. Ceramic 120pF, J, SL	1270121
C79	Cap. Ceramic 0.01μF, Z	12F3103
C80	Cap. Ceramic 0.01μF, Z	12F3103
C81	Cap. Ceramic 0.01μF, Z	12F3103
C82	Cap. Ceramic 180pF, J, SL	1270181
C83	Cap. Ceramic 27pF, J, SL	1270270
C84	Cap. Ceramic 0.022μF, Z	12F3223
C85	Cap. Ceramic 0.022μF, Z	12F3223
C86	Cap. Electrolytic 33μF/16V	126C336
C87	Cap. Ceramic 0.022μF, Z	12F3223
C88	Cap. Electrolytic 10μF/10V	126B106
C89	Cap. Ceramic 0.01μF, Z	12F3103
C90	Cap. Ceramic 0.022μF, Z	12F3223
C91	Cap. Ceramic 0.01μF, Z	12F3103
C92	Cap. Electrolytic 47μF/10V	126B476
C93	Cap. Electrolytic 1μF/50V	126F105
C94	Cap. Ceramic 0.01μF, Z	12F3103
C95	Cap. Electrolytic 1μF/50V	126F105
C96	Cap. Ceramic 0.01μF, Z	12F3103
C97	Cap. Ceramic 0.01μF, Z	12F3103
C98	Cap. Ceramic 0.01μF, Z	12F3103
C99	Cap. Ceramic 0.01μF, Z	12F3103
C100	Cap. Ceramic 330pF, J, SL	1270331
C101	Cap. Ceramic 0.022μF, Z	12F3223
C102	Cap. Ceramic 0.01μF, Z	12F3103
C103	Cap. Electrolytic 33μF/16V	126C336
C104	Cap. Ceramic 0.01μF, Z	12F3103
C105	Cap. Ceramic 0.01μF, Z	12F3103
C106	Cap. Ceramic 100pF, J, SL	1270101
C107	Cap. Ceramic 100pF, J, SL	1270101
C108	Cap. Ceramic 0.01μF, Z	12F3103
C109	Cap. Ceramic 0.01μF, Z	12F3103
C110	Cap. Ceramic 0.022μF, Z	12F3223
C111	Cap. Electrolytic 33μF/16V	126C336
C112	Cap. Electrolytic 33μF/10V	126B336
C113	Cap. Electrolytic 1μF/50V	126F105
C114	Cap. Electrolytic 1μF/50V, NP	126X105
C115	Cap. Electrolytic 1μF/50V	126F105
C116	Cap. Ceramic 0.0018μF, YB	12B3182
C117	Cap. Ceramic 820pF, YB	12B3821

Ref. No.	Description	Parts No.
C118	Cap. Ceramic 0.0012μF, YB	12B3122
C119	Cap. Mylar 0.018μF/50V, K	1250183
C120	Cap. Electrolytic 10μF/10V	126B106
C121	Cap. Ceramic 120pF, J, CH, NPO	12CH121
C122	Cap. Ceramic 180pF, J, CH, NPO	12CH181
C123	Cap. Ceramic 220pF, J, SL	1270221
C124	Cap. Ceramic 820pF, YB	12B3821
C125	Cap. Electrolytic 10μF/10V	126B106
C126	Cap. Ceramic 0.01μF, Z	12F3103
C127	Cap. Ceramic 0.01μF, Z	12F3103
C128	Cap. Ceramic 3pF, J, SL	1270309
C130	Cap. Ceramic 0.01μF, Z	12F3103
C131	Cap. Electrolytic 33μF/16V	126C336
C132	Cap. Ceramic 0.01μF, Z	12F3103
C133	Cap. Ceramic 15pF, J, SL	1270150
C134	Cap. Ceramic 100pF, J, SL	1270101
C135	Cap. Ceramic 0.01μF, Z	12F3103
C136	Cap. Ceramic 0.01μF, Z	12F3103
C137	Cap. Electrolytic 1μF/50V	126F105
C138	Cap. Ceramic 0.01μF, Z	12F3103
C139	Cap. Ceramic 0.01μF, Z	12F3103
C140	Cap. Ceramic 150pF, J, CH, NPO	12CH151
C141	Cap. Ceramic 100pF, J, CH, NPO	12CH101
C142	Cap. Ceramic 12pF, J, CH, NPO	12CH120
C144	Cap. Electrolytic 100μF/10V	126B107
C145	Cap. Electrolytic 22μF/16V	126R155
C146	Cap. Ceramic 0.022μF, Z	12F3223
C148	Cap. Ceramic 0.01μF, Z	12F3103
C149	Cap. Ceramic 0.1μF, Z	1250104
C150	Cap. Ceramic 33μF/10V	126B336
C151	Cap. Electrolytic 33μF/10V	126B336
C152	Cap. Ceramic 0.022μF, Z	12F3223
C153	Cap. Ceramic 0.022μF, Z	12F3223
C154	Cap. Ceramic 100pF, J, SL	1270101
C155	Cap. Ceramic 33pF, J	1270330
C301	Cap. Electrolytic 10μF/16V	126C106
C302	Cap. Ceramic 0.022μF, Z	12F3223
C303	Cap. Mylar 0.068μF/50V, K	1250683
C304	Cap. Mylar 0.001μF/50V, K	1250102
C305	Cap. Mylar 0.047μF/50V, K	1250473
C306	Cap. Mylar 0.01μF/50V, K	1250103
C307	Cap. Mylar 0.15μF/50V, K	1250154
C308	Cap. Mylar 0.1μF/50V, K	1250104
C309	Cap. Electrolytic 0.22μF/50V	126F224
C310	Cap. Electrolytic 220μF/10V	526S227
C311	Cap. Mylar 0.1μF/50V, K	1250104
C312	Cap. Electrolytic 1μF/50V	126F105
C313	Cap. Electrolytic 10μF/16V	126C106
C315	Cap. Mylar 0.033μF/50V, K	1250333
C316	Cap. Mylar 0.033μF/50V, K	1250333
C317	Cap. Mylar 0.033μF/50V, K	1250333
C318	Cap. Mylar 0.047μF/50V, K	1250473
C319	Cap. Mylar 0.001μF/50V, K	1250102
C320	Cap. Mylar 0.0047μF/50V, K	1250472
C321	Cap. Mylar 0.022μF/50V, K	1250223

Ref. No.	Description	Parts No.
C322	Cap. Electrolytic 1μF/50V	126F105
C323	Cap. Electrolytic 470μF/10V	126B477
C324	Cap. Ceramic 560pF, J, SL	1270561
C325	Cap. Electrolytic 47μF/16V	126C476
C326	Cap. Electrolytic 47μF/10V	126B476
C327	Cap. Ceramic 0.01μF, Z	12F3103
C328	Cap. Ceramic 0.047μF, Z	12F3473
C329	Cap. Electrolytic 10μF/10V	126B106
C330	Cap. Electrolytic 47μF/16V	126C476
C331	Cap. Electrolytic 10μF/16V	126C106
C332	Cap. Electrolytic 47μF/16V	126C476
C333	Cap. Mylar 0.01μF/50V, K	1250103
C334	Cap. Mylar 0.047μF/50V, K	1250473
C335	Cap. Electrolytic 3.3μF/16V	126C335
C336	Cap. Electrolytic 4.7μF/50V	126F475
C337	Cap. Electrolytic 0.68μF/50V	126F684
C338	Cap. Ceramic 270pF, J, SL	1270271
C339	Cap. Ceramic 0.082μF, YB	12B3822
C340	Cap. Ceramic 0.022μF, Z	12F3223
C341	Cap. Ceramic 100pF, J, SL	1270101
C342	Cap. Mylar 0.01μF/50V, K	1250103
C343	Cap. Mylar 0.033μF/50V, K	1250333
C344	Cap. Mylar 0.047μF, Z	12F3473
C345	Cap. Ceramic 470pF, J, SL	1270471
C346	Cap. Electrolytic 4.7μF/50V	126F475
C347	Cap. Electrolytic 1.5μF/50V	126F155
C348	Cap. Ceramic 0.022μF, Z	12F3223
C349	Cap. Electrolytic 100μF/10V	126B107
C350	Cap. Electrolytic 1000μF/16V	126C108
C351	Cap. Electrolytic 47μF/16V	126C476
C352	Cap. Electrolytic 1.5μF/50V, LL	124R155
C353	Cap. Semi-Conductor 0.1μF/25V, JV	1220461
C354	Cap. Electrolytic 22μF/16V, NP	126R226
C355	Cap. Semi-Conductor 0.1μF/25V, JV	1220461
C356	Cap. Ceramic 0.01μF, Z	12F3103
C367	Cap. Ceramic 0.01μF, Z	12F3103
C358	Cap. Ceramic 0.01μF, Z	12F3103
C359	Cap. Ceramic 0.01μF, Z	12F3103
C360	Cap. Ceramic 0.01μF, Z	12F3103
C361	Cap. Ceramic 0.01μF, Z	12F3103
C363	Cap. Electrolytic 0.33μF/50V	526W334
C364	Cap. Semi-Conductor 0.1μF/25V, JV	1220461

RESISTORS

R1	Res. Carbon 10 ohm, 1/5W, J	132A100
R2	Res. Carbon 10 ohm, 1/5W, J	132A100
R3	Res. Carbon 3.3K ohm, 1/5W, J	132A332
R4	Res. Carbon 3.3K ohm, 1/5W, J	132A332
R5	Res. Carbon 150K ohm, 1/5W, J	132A154
R6	Res. Carbon 150K ohm, 1/5W, J	132A154
R7	Res. Carbon 75K ohm, 1/5W, J	132A753
R8	Res. Carbon 75K ohm, 1/5W, J	132A753
R9	Res. Carbon 1.2K ohm, 1/5W, J	132A122
R10	Res. Carbon 1.2K ohm, 1/5W, J	132A122
R11	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R12	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R13	Res. Carbon 120 ohm, 1/5W, J	132A121
R14	Res. Carbon 120 ohm, 1/5W, J	132A121
R15	Res. Carbon 180 ohm, 1/5W, J	132A181
R16	Res. Carbon 470 ohm, 1/5W, J	132A471
R17	Res. Carbon 6.8 ohm, 1/5W, J	132A689
R18	Res. Carbon 10K ohm, 1/5W, J	132A103
R19	Res. Carbon 1.2K ohm, 1/5W, J	132A122
R20	Res. Fuse 6.8 ohm, 1/4W, J	5361689
R21	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R22	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R23	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R24	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R25	Res. Carbon 1K ohm, 1/5W, J	132A102
R26	Res. Carbon 1K ohm, 1/5W, J	132A102
R27	Res. Carbon 560 ohm, 1/5W, J	132A561
R28	Res. Carbon 1K ohm, 1/5W, J	132A102
R29	Res. Carbon 22K ohm, 1/5W, J	132A223
R30	Res. Carbon 1K ohm, 1/5W, J	132A102
R31	Res. Carbon 680 ohm, 1/5W, J	132A681
R32	Res. Carbon 5.6K ohm, 1/5W, J	132A562
R33	Res. Carbon 1K ohm, 1/5W, J	132A102
R34	Res. Carbon 10K ohm, 1/5W, J	132A103
R35	Res. Carbon 4.7K ohm, 1/5W, J	132A472
R36	Res. Carbon 150K ohm, 1/5W, J	132A154
R37	Res. Carbon 100 ohm, 1/5W, J	132A101
R38	Res. Carbon 33K ohm, 1/5W, J	132A333
R39	Res. Carbon 390 ohm, 1/5W, J	132A391
R40	Res. Carbon 390 ohm, 1/5W, J	132A391
R41	Res. Carbon 100 ohm, 1/5W, J	132A101
R42	Res. Carbon 10K ohm, 1/5W, J	132A103
R43	Res. Carbon 10K ohm, 1/5W, J	132A103
R45	Res. Carbon 1.8K ohm, 1/5W, J	132A182
R46	Res. Carbon 3.3K ohm, 1/5W, J	132A332
R47	Res. Carbon 820 ohm, 1/5W, J	132A821
R50	Res. Carbon 33K ohm, 1/5W, J	132A333
R51	Res. Carbon 510 ohm, 1/5W, J	132A511
R52	Res. Carbon 180 ohm, 1/5W, J	132A181
R53	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R54	Res. Carbon 680 ohm, 1/5W, J	132A681
R55	Res. Carbon 330 ohm, 1/5W, J	132A331
R56	Res. Carbon 1K ohm, 1/5W, J	132A102
R57	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R58	Res. Carbon 5.1K ohm, 1/5W, J	132A512
R59	Res. Carbon 1.8K ohm, 1/5W, J	132A182
R60	Res. Carbon 390 ohm, 1/5W, J	132A391
R61	Res. Carbon 6.8K ohm, 1/5W, J	132A682
R62	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R63	Res. Carbon 10K ohm, 1/5W, J	132A103
R64	Res. Carbon 330 ohm, 1/5W, J	132A331
R65	Res. Carbon 820 ohm, 1/5W, J	132A821
R66	Res. Carbon 10K ohm, 1/5W, J	132A103
R68	Res. Carbon 910 ohm, 1/5W, J	132A911
R69	Res. Carbon 390 ohm, 1/5W, J	132A391

Ref. No.	Description	Parts No.
R70	Res. Carbon 470K ohm, 1/5W, J	132A474
R71	Res. Carbon 47K ohm, 1/5W, J	132A473
R72	Res. Carbon 75K ohm, 1/5W, J	132A753
R73	Res. Carbon 22K ohm, 1/5W, J	132A223
R74	Res. Carbon 100K ohm, 1/5W, J	132A104
R75	Res. Carbon 22K ohm, 1/5W, J	132A223
R76	Res. Carbon 47K ohm, 1/5W, J	132A473
R77	Res. Carbon 10K ohm, 1/5W, J	132A103
R78	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R79	Res. Carbon 1.1K ohm, 1/5W, J	132A112
R80	Res. Carbon 4.7K ohm, 1/5W, J	132A472
R81	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R82	Res. Carbon 100 ohm, 1/5W, J	132A101
R83	Res. Carbon 220K ohm, 1/5W, J	132A224
R84	Res. Carbon 330 ohn, 1/5W, J	132A331
R85	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R86	Res. Carbon 22K ohm, 1/5W, J	132A223
R87	Res. Carbon 33K ohm, 1/5W, J	132A333
R88	Res. Carbon 330 ohm, 1/4W, J	1345331
R89	Res. Carbon 68 ohm, 1/5W, J	132A680
R90	Res. Carbon 1K ohm, 1/5W, J	132A102
R91	Res. Carbon 1.2K ohm, 1/5W, J	132A122
R92	Res. Carbon 1K ohm, 1/5W, J	132A102
R93	Res. Carbon 6.8K ohm, 1/5W, J	132A682
R94	Res. Carbon 3.9M ohm, 1/4W, J	1345395
R96	Res. Carbon 100 ohm, 1/5W, J	132A101
R97	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R98	Res. Carbon 1K ohm, 1/5W, J	132A102
R99	Res. Carbon 1.8K ohm, 1/5W, J	132A182
R100	Res. Carbon 1K ohm, 1/5W, J	132A102
R101	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R102	Res. Carbon 2.2M ohm, 1/5W, J	132A225
R103	Res. Carbon 2.7K ohm, 1/5W, J	132A272
R104	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R105	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R106	Res. Carbon 5.6K ohm, 1/5W, J	132A562
R107	Res. Carbon 10K ohm, 1/5W, J	132A103
R109	Res. Carbon 1.8K ohm, 1/5W, J	132A182
R111	Res. Carbon 3.3K ohm, 1/5W, J	132A332
R112	Res. Carbon 10K ohm, 1/5W, J	132A103
R114	Res. Carbon 6.8K ohm, 1/5W, J	132A682
R115	Res. Carbon 10K ohm, 1/5W, J	132A103
R116	Res. Carbon 1.8K ohm, 1/5W, J	132A182
R117	Res. Carbon 6.8K ohm, 1/5W, J	132A682
R118	Res. Carbon 3.3K ohm, 1/5W, J	132A332
R119	Res. Carbon 470 ohm, 1/5W, J	132A471
R120	Res. Carbon 910 ohm, 1/5W, J	132A911
R121	Res. Carbon 560K ohm, 1/5W, J	132A664
R122	Res. Carbon 270 ohm, 1/5W, J	132A271
R124	Res. Carbon 680 ohm, 1/5W, J	132A681
R125	Res. Carbon 1K ohm, 1/5W, J	132A102
R126	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R127	Res. Carbon 56K ohm, 1/5W, J	132A563
R128	Res. Carbon 4.7K ohm, 1/5W, J	132A472

Ref. No.	Description	Parts No.
R129	Res. Carbon 3.3K ohm, 1/5W, J	132A332
R130	Res. Carbon 1K ohm, 1/5W, J	132A102
R131	Res. Carbon 2.0K ohm, 1/5W, J	132A202
R132	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R133	Res. Carbon 4.7K ohm, 1/5W, J	132A472
R134	Res. Carbon 27K ohm, 1/5W, J	132A273
R135	Res. Carbon 27K ohm, 1/5W, J	132A273
R136	Res. Carbon 4.7K ohm, 1/5W, J	132A472
R137	Res. Carbon 1K ohm, 1/5W, J	132A102
R138	Res. Carbon 3.3K ohm, 1/5W, J	132A332
R141	Res. Carbon 510 ohm, 1/5W, J	132A511
R142	Res. Carbon 1K ohm, 1/5W, J	132A102
R143	Res. Carbon 3.3K ohm, 1/5W, J	132A332
R144	Res. Carbon 270 ohm, 1/5W, J	132A271
R145	Res. Carbon 270 ohm, 1/5W, J	132A271
R146	Res. Carbon 33K ohm, 1/5W, J	132A333
R147	Res. Carbon 220 ohm, 1/5W, J	132A221
R148	Res. Carbon 1K ohm, 1/5W, J	132A102
R149	Res. Carbon 3.3K ohm, 1/5W, J	132A332
R150	Res. Carbon 3.3K ohm, 1/5W, J	132A332
R151	Res. Carbon 1K ohm, 1/5W, J	132A102
R152	Res. Carbon 22 ohm, 1/5W, J	132A220
R153	Res. Carbon 22 ohm, 1/5W, J	132A220
R154	Res. Carbon 10 ohm, 1/5W, J	132A100
R155	Res. Carbon 1.5K ohm, 1/5W, J	132A152
R156	Res. Carbon 220 ohm, 1/5W, J	132A221
R157	Res. Carbon 47K ohm, 1/5W, J	132A473
R158	Res. Carbon 22K ohm, 1/5W, J	132A223
R159	Res. Carbon 1K ohm, 1/5W, J	132A102
R160	Res. Carbon 3.3K ohm, 1/5W, J	132A332
R161	Res. Carbon 10K ohm, 1/5W, J	132A103
R162	Res. Carbon 22K ohm, 1/5W, J	132A223
R163	Res. Carbon 22K ohm, 1/5W, J	132A223
R164	Res. Carbon 680K ohm, 1/5W, J	132A684
R165	Res. Carbon 220K ohm, 1/5W, J	132A224
R167	Res. Carbon 10K ohm, 1/5W, J	132A103
R168	Res. Carbon 470 ohm, 1/5W, J	132A471
R169	Res. Carbon 22K ohm, 1/5W, J	132A223
R170	Res. Carbon 1.5K ohm, 1/5W, J	132A152
R171	Res. Carbon 1K ohm, 1/5W, J	132A102
R172	Res. Carbon 68K ohm, 1/5W, J	132A683
R173	Res. Carbon 33K ohm, 1/5W, J	132A333
R174	Res. Carbon 330 ohm, 1/5W, J	132A331
R175	Res. Carbon 150 ohm, 1/5W, J	132A151
R176	Res. Carbon 33K ohm, 1/5W, J	132A333
R177	Res. Carbon 6.8K ohm, 1/5W, J	132A682
R178	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R179	Res. Carbon 470 ohm, 1/5W, J	132A471
R180	Res. Carbon 1K ohm, 1/5W, J	132A102
R181	Res. Carbon 1.5K ohm, 1/5W, J	132A152
R182	Res. Carbon 3.3K ohm, 1/5W, J	132A332
R183	Res. Carbon 5.6K ohm, 1/5W, J	132A562
R184	Res. Carbon 470 ohm, 1/5W, J	132A471
R185	Res. Carbon 3.9K ohm, 1/5W, J	132A392
R186	Res. Carbon 6.8K ohm, 1/5W, J	132A682
R187	Res. Carbon 5.6K ohm, 1/5W, J	132A562

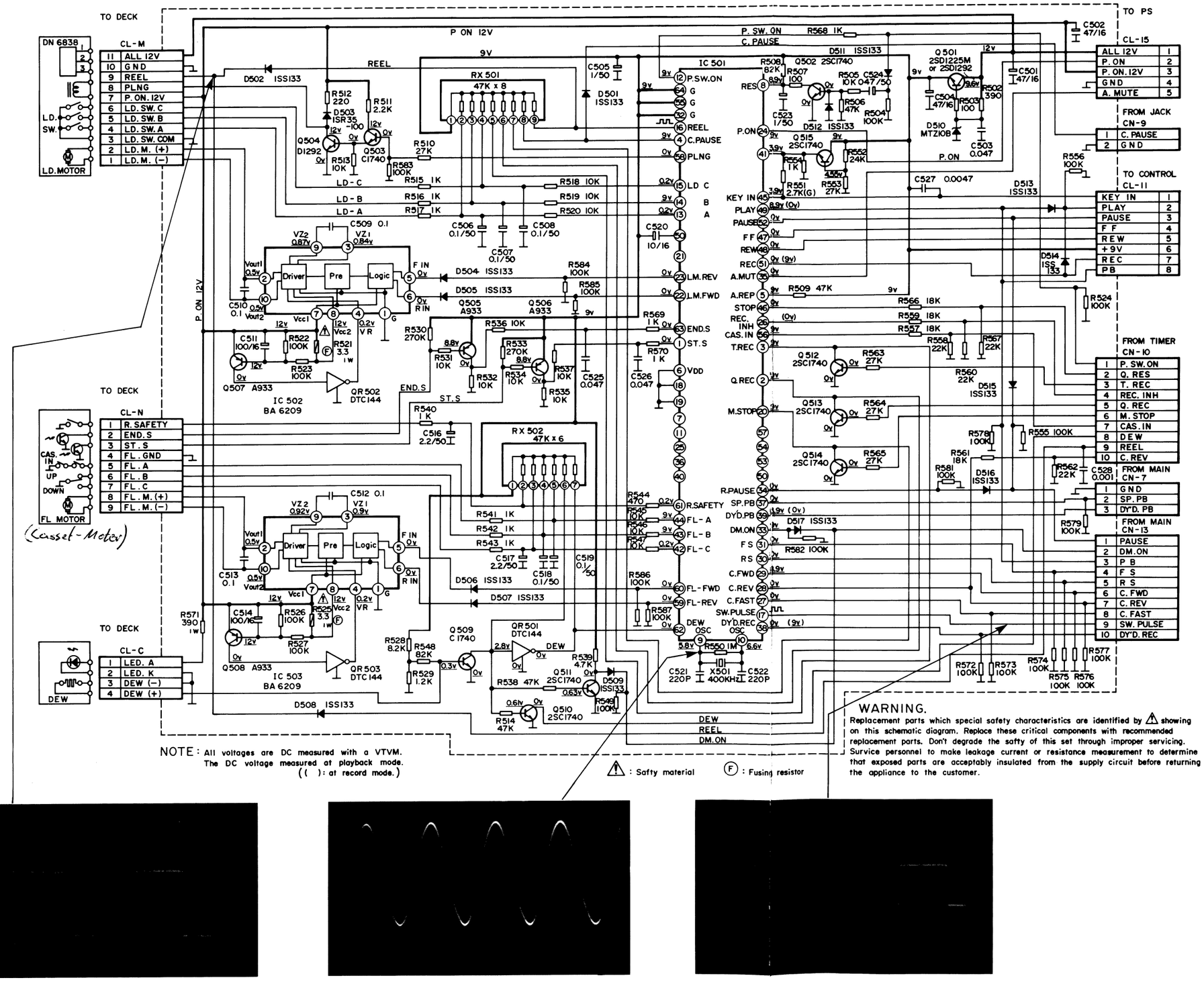
Ref. No.	Description	Parts No.
R188	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R189	Res. Carbon 560 ohm, 1/5W, J	132A561
R190	Res. Carbon 1.2K ohm, 1/5W, J	132A122
R191	Res. Carbon 4.7K ohm, 1/5W, J	132A472
R192	Res. Fuse 6.8 ohm, 1/4W, J	5361689
R193	Res. Carbon 1K ohm, 1/5W, J	132A102
R194	Res. Carbon 1K ohm, 1/5W, J	132A102
R196	Res. Carbon 3.3K ohm, 1/5W, J	132A332
R197	Res. Carbon 470 ohm, 1/5W, J	132A471
R198	Res. Carbon 1.8K ohm, 1/5W, J	132A182
R199	Res. Fuse 6.8 ohm, 1/4W, J	5361689
R200	Res. Carbon 47K ohm, 1/5W, J	132A473
R201	Res. Carbon 47K ohm, 1/4W, J	6346473
R202	Res. Carbon 390K ohm, 1/5W, J	132A394
R203	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R240	Res. Carbon 470K ohm, 1/5W, J	132A474
R206	Res. Carbon 470K ohm, 1/5W, J	132A474
R207	Res. Carbon 620 ohm, 1/5W, J	132A621
R208	Res. Carbon 620 ohm, 1/5W, J	132A621
R209	Res. Carbon 22Kohm, 1/5W, J	132A223
R210	Res. Carbon 68Kohm,	132A680
R211	Res. Carbon 10Kohm, 1/5W, J	132A103
R212	Res. Carbon 10Kohm, 1/5W, J	132A103
R213	Res. Carbon 820 ohm, 1/5W, J	132A821
R214	Res. Carbon 1.8K ohm, 1/5W, J	132A182
R215	Res. Metal Oxide 270 ohm	1330315
R217	Res. Carbon 5.6K ohm, 1/5W, J	132A562
R218	Res. Carbon 22K ohm, 1/5W, J	132A223
R219	Res. Carbon 22K ohm, 1/5W, J	132A223
R220	Res. Carbon 10K ohm, 1/5W, J	132A103
R221	Res. Carbon 22K ohm, 1/5W, J	132A223
R222	Res. Carbon 22K ohm, 1/5W, J	132A223
R223	Res. Carbon 10K ohm, 1/5W, J	132A103
R224	Res. Carbon 22K ohm, 1/5W, J	132A223
R225	Res. Carbon 56K ohm, 1/5W, J	132A563
R226	Res. Fuse 6.8 ohm, 1/4W, J	5361689
R228	Res. Fuse 12 ohm, 1/4W, J	5361120
R301	Res. Carbon 1K ohm, 1/5W, J	132A102
R302	Res. Carbon 22K ohm, 1/5W, J	132A223
R303	Res. Carbon 47K ohm, 1/5W, J	132A473
R304	Res. Carbon 10K ohm, 1/5W, J	132A103
R305	Res. Carbon 47K ohm, 1/5W, J	132A473
R306	Res. Carbon 270 ohm, 1/5W, J	132A271
R307	Res. Carbon 27K ohm, 1/5W, J	132A273
R308	Res. Carbon 150K ohm, 1/5W, J	132A154
R309	Res. Carbon 47K ohm, 1/5W, J	132A473
R310	Res. Carbon 100K ohm, 1/5W, J	132A104
R311	Res. Carbon 10K ohm, 1/5W, J	132A103
R312	Res. Carbon 120K ohm, 1/5W, J	132A124
R313	Res. Carbon 10K ohm, 1/5W, J	132A103
R314	Res. Carbon 22K ohm, 1/5W, J	132A223
R315	Res. Carbon 56 ohm, 1/5W, J	132A560
R316	Res. Carbon 390K ohm, 1/5W, J	132A394
R317	Res. Carbon 1K ohm, 1/5W, J	132A102
R318	Res. Carbon 330K ohm, 1/5W, J	132A334
R319	Res. Carbon 470K ohm, 1/5W, J	132A474
R320	Res. Carbon 1.2M ohn, 1/5W, J	132A125
R321	Res. Carbon 820 ohm, 1/5W, J	132A821

Ref. No.	Description	Parts No.
R322	Res. Carbon 220 ohm, 1/4W, J	1345221
R323	Res. Carbon 10K ohm, 1/5W, J	132A103
R324	Res. Carbon 47K ohm, 1/5W, J	132A473
R325	Res. Carbon 6.8K ohm, 1/5W, J	132A682
R326	Res. Carbon 47K ohm, 1/5W, J	132A473
R327	Res. Carbon 10K ohm, 1/5W, J	132A103
R328	Res. Carbon 4.7K ohm, 1/5W, J	132A472
R329	Res. Carbon 15K ohm, 1/5W, J	132A153
R330	Res. Carbon 1K ohm, 1/5W, J	132A102
R331	Res. Carbon 15K ohm, 1/5W, J	132A153
R332	Res. Carbon 15K ohm, 1/5W, J	132A153
R333	Res. Carbon 150K ohm, 1/5W, J	132A154
R334	Res. Carbon 47K ohm, 1/5W, J	12A473
R335	Res. Carbon 10K ohm, 1/5W, J	132A103
R336	Res. Carbon 82K ohm, 1/5W, J	132A823
R337	Res. Carbon 10K ohm, 1/5W, J	132A103
R338	Res. Carbon 10K ohm, 1/5W, J	132A103
R339	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R340	Res. Carbon 27K ohm, 1/5W, J	132A273
R341	Res. Carbon 47K ohm, 1/5W, J	132A473
R342	Res. Carbon 27K ohm, 1/5W, J	132A273
R343	Res. Carbon 27K ohm, 1/5W, J	132A273
R344	Res. Carbon 27K ohm, 1/5W, J	132A273
R345	Res. Carbon 27K ohm, 1/5W, J	132A273
R346	Res. Carbon 27K ohm, 1/5W, J	132A273
R347	Res. Carbon 27K ohm, 1/5W, J	132A273
R348	Res. Carbon 47K ohm, 1/5W, J	132A473
R349	Res. Carbon 47K ohm, 1/5W, J	132A473
R350	Res. Carbon 47K ohm, 1/5W, J	132A473
R351	Res. Carbon 27K ohm, 1/5W, J	132A273
R352	Res. Carbon 1.2K ohm, 1/5W, J	132A122
R353	Res. Carbon 27K ohm, 1/5W, J	132A273
R354	Res. Carbon 5.6K ohm, 1/5W, J	132A562
R355	Res. Carbon 15K ohm, 1/5W, J	132A153
R356	Res. Carbon 180 ohm, 1/5W, J	132A181
R357	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R358	Res. Carbon 1K ohm, 1/5W, J	132A102
R359	Res. Carbon 4.3K ohm, 1/5W, J	132A432
R360	Res. Carbon 33K ohm, 1/5W, J	132A333
R361	Res. Carbon 100K ohm, 1/5W, J	132A104
R362	Res. Carbon 4.7K ohm, 1/5W, J	132A472
R363	Res. Carbon 8.2K ohm, 1/5W, J	132A822
R364	Res. Carbon 24K ohm, 1/5W, J	132A243
R365	Res. Carbon 47K ohm, 1/5W, J	132A473
R366	Res. Carbon 18K ohm, 1/5W, J	132A183
R367	Res. Carbon 1K ohm, 1/5W, J	132A102
R368	Res. Carbon 10K ohm, 1/5W, J	132A103
R369	Res. Carbon 5.6K ohm, 1/5W, J	132A562
R370	Res. Carbon 10K ohm, 1/5W, J	132A103
R371	Res. Carbon 1K ohm, 1/5W, J	132A102
R372	Res. Carbon 330K ohm, 1/5W, J	132A334
R373	Res. Carbon 10K ohm, 1/5W, J	132A103
R374	Res. Carbon 560K ohm, 1/5W, J	132A564
R375	Res. Carbon 6.8K ohm, 1/5W, J	132A682
R376	Res. Carbon 47K ohm, 1/5W, J	132A473
R377	Res. Carbon 75K ohm, 1/5W, J	132A753
R378	Res. Carbon 27K ohm, 1/5W, J	132A273
R379	Res. Carbon 27K ohm, 1/5W, J	132A273

Ref. No.	Description	Parts No.
R380	Res. Carbon 820 ohm, 1/5W, J	132A821
R381	Res. Carbon 27K ohm, 1/5W, J	132A273
R382	Res. Carbon 10K ohm, 1/5W, J	132A103
R383	Res. Carbon 82K ohm, 1/5W, J	132A823
R384	Res. Carbon 27K ohm, 1/5W, J	132A273
R385	Res. Carbon 15K ohm, 1/5W, J	132A153
R386	Res. Carbon 10K ohm, 1/5W, J	132A103
R387	Res. Carbon 1K ohm, 1/5W, J	132A102
R391	Res. Carbon 10K ohm, 1/5W, J	132A103
R392	Res. Carbon 1K ohm, 1/5W, J	132A102
R393	Res. Carbon 330K ohm, 1/5W, J	132A334
R394	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R395	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R396	Res. Carbon 10K ohm, 1/5W, J	132A103
R397	Res. Carbon 47K ohm, 1/5W, J	132A473
R398	Res. Metal Oxide 1.5 ohm, 1W, J	1330317
R401	Res. Carbon 47K ohm, 1/5W, J	132A473
R402	Res. Carbon 5.6K ohm, 1/5W, J	132A562
R403	Res. Carbon 47 ohm, 1/5W, J	132A470
R404	Res. Carbon 560 ohm, 1/5W, J	132A561
R405	Res. Carbon 47K ohm, 1/5W, J	132A473
R406	Res. Carbon 47K ohm, 1/5W, J	132A473
R407	Res. Carbon 4.7K ohm, 1/5W, J	132A472
R408	Res. Carbon 1K ohm, 1/5W, J	132A102
R409	Res. Carbon 10K ohm, 1/5W, J	132A103
R410	Res. Carbon 27K ohm, 1/5W, J	132A273
R411	Res. Carbon 47K ohm, 1/5W, J	132A473
R412	Res. Carbon 47K ohm, 1/5W, J	132A473
R413	Res. Carbon 470 ohm, 1/5W, J	132A471
R414	Res. Carbon 8.2K ohm, 1/5W, J	132A822
R415	Res. Metal Oxide 3.3 ohm, 2W, J	1330318
R416	Res. Carbon 120 ohm, 1/5W, J	134A124
R417	Res. Carbon 1.5M ohm, 1/5W, J	134A155
VR1	Res. Semi-Fixed, Carbon 2K ohm	138J778 or 138N778
VR2	Res. Semi-Fixed, Carbon 2K ohm	138J778 or 138N778
VR3	Res. Semi-Fixed, Carbon 2K ohm	138J778 or 138N778
VR4	Res. Semi-Fixed, Carbon 5K ohm	138J780 or 138N780
VR5	Res. Semi-Fixed, Carbon 1K ohm	138J777 or 138N777
VR6	Res. Semi-Fixed, Carbon 5K ohm	138J780 or 138N780
VR7	Res. Semi-Fixed, Carbon 20K ohm	138N782 or 138N782
VR8	Res. Semi-Fixed, Carbon 20K ohm	138J782 or 138N782
VR9	Res. Semi-Fixed, Carbon 10K ohm	138J781 or 138N781
VR10	Res. Semi-Fixed, Carbon 10K ohm	138J781 or 138N781

Ref. No.	Description	Parts No.
VR11	Res. Semi-Fixed, Carbon 2K ohm	138J778 or 138N778
VR12	Res. Semi-Fixed, Carbon 500 ohm	138J776 or 138N776
VR13	Res. Semi-Fixed, Carbon 5K ohm	138J780 or 138N780
VR14	Res. Semi-Fixed, Carbon 500 ohm	138J776 or 138N776
VR301	Res. Semi-Fixed, Carbon 500K ohm, B	138J788 or 138N788
VR302	Res. Semi-Fixed, Metal 100K ohm, B	1380792
VR303	Res. Semi-Fixed, Metal 100K ohm, B	1380792
VR304	Res. Semi-Fixed, Carbon 500K ohm, B	138J788 or 138N788
VR305	Res. Semi-Fixed, Metal 100K ohm, B	1380792
VR306	Res. Semi-Fixed, Metal 50K ohm, B	1380791
VR307	Res. Semi-Fixed, Metal 50K ohm, B	1380791
VR308	Res. Semi-Fixed, Metal 50K ohm, B	1380791
VR309	Res. Semi-Fixed, Carbon 30K ohm, B	138J788 or 138N783
VR310	Res. Semi-Fixed, Metal 100K ohm, B	1380792
	FILTERS	
T1	Filter (LPF. EQ) 0581-044	1810581
T2	Filter (5.69M Trap) 4143-3099-207	1810583
T3	Filter (4.43M BPF) 0581-046	1810582
T4	Filter (PAL. EQ) 0576-047	1810585
	TRIMMERS	
VC1	Cap. Trimmer 60pF	1280143
VC2	Cap. Trimmer 60pF	1280143
VC3	Cap. Trimmer 10pF	1280142
VC4	Cap. Trimmer 10pF	1280142
	MISCELLANEOUS	
CF1	Filter, Ceramic SFS 5.06 MB	1810497
CF2	Filter, Ceramic SFE 4.5MB	1810359
X1	X-TAL (HC-18/μ) 4.435572MHz	V811007
X2	X-TAL (HC-18/μ) 4.433614MHz	V811006
DL1	Delay 1H EFD-YN645A13E	1810586
DL2	Delay 2H EFD-BR124A13P	1810584
TP17	Rapping Pin	1740343
TP21	Rapping Pin	1740343
TP311	Rapping Pin	1740343
CN6	Connector (Base Post) 6P	1740458
CN8	Connector (Base Post) 2P	1740764

SCHEMATIC DIAGRAM (System Control)

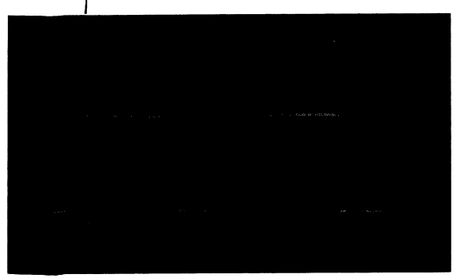


NOTE : All voltages are DC measured with a VTVM.
The DC voltage measured at playback mode.
( ) : at record mode.)

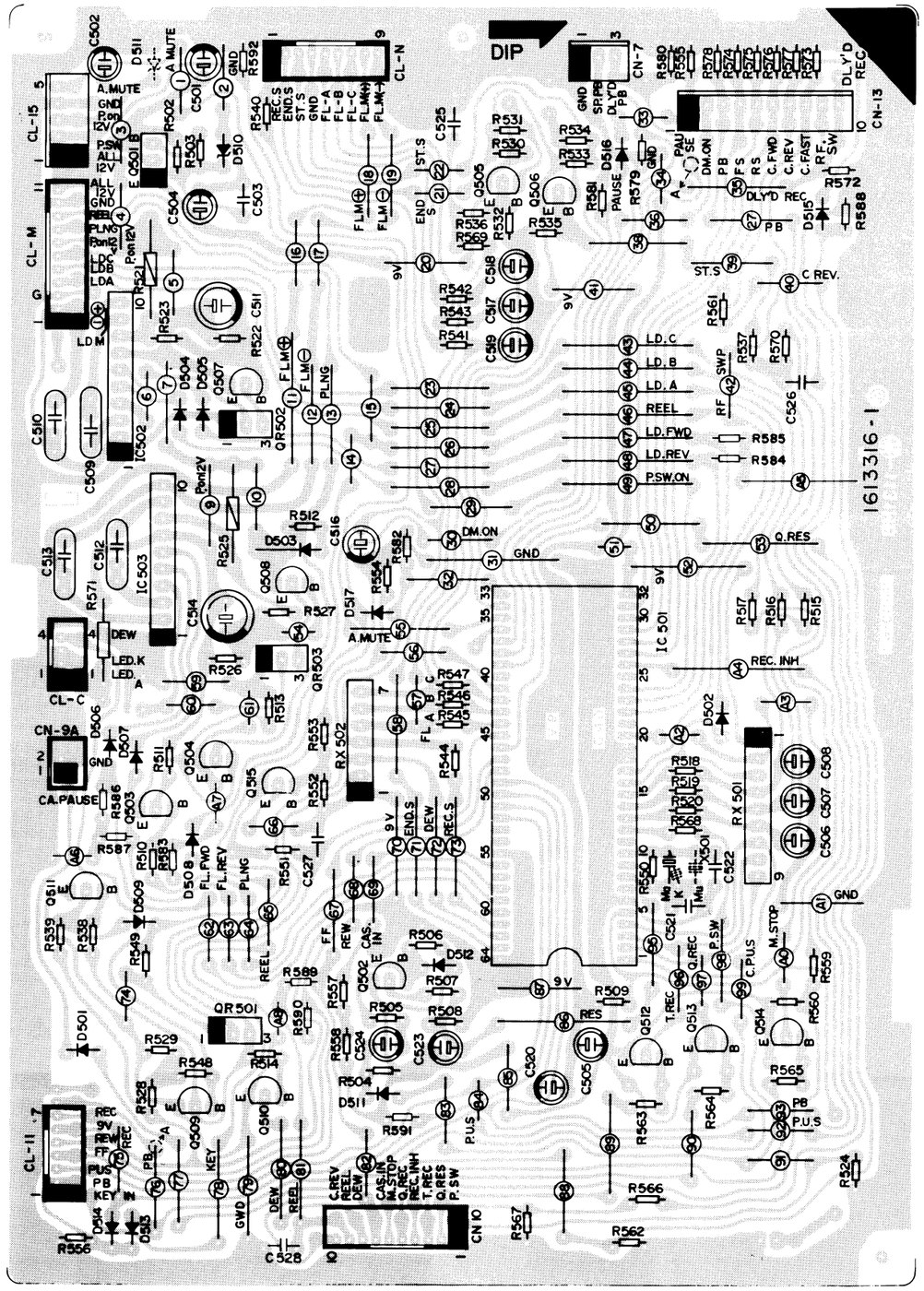
⚠ : Safty material Ⓕ : Fusing resistor

WARNING.

Replacement parts which special safety characteristics are identified by ⚠ showing on this schematic diagram. Replace these critical components with recommended replacement parts. Don't degrade the safty of this set through improper servicing. Service personnel to make leakage current or resistance measurement to determine that exposed parts are acceptably insulated from the supply circuit before returning the appliance to the customer.



P.C. Board (System Control)



Electrical Parts List

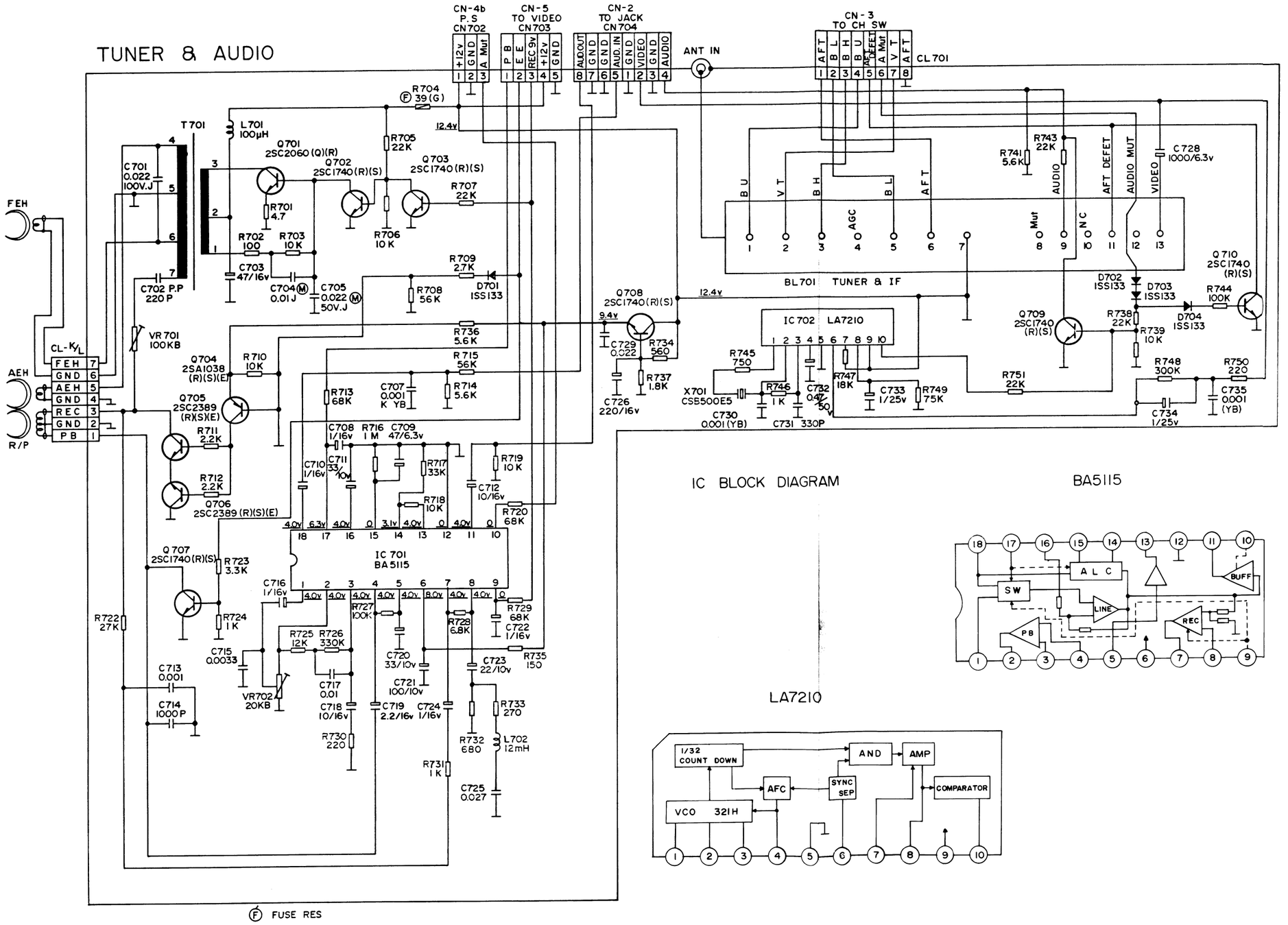
Ref. No.	Description	Parts No.
	TRANSISTORS	
Q501	Transistor, 2SD1225M (Q or R) or 2SD1292 (Q or R)	D1225M (Q or R) D1292 (Q or R)
Q502	Transistor, 2SC1740 (Q or R)	C1740 (Q or R)
Q503	Transistor, 2SC1740 (Q or R)	C1740 (Q or R)
Q504	Transistor, 2SD1292 (Q or R)	D1292 (Q or R)
Q505	Transistor, 2SA933 (Q or R)	A933 (Q or R)
Q506	Transistor, 2SA933 (Q or R)	A933 (Q or R)
Q507	Transistor, 2SA933 (Q or R)	A933 (Q or R)
Q508	Transistor, 2SA933 (Q or R)	A933 (Q or R)
C509	Transistor, 2SC1740 (Q or R)	C1740 (Q or R)
Q510	Transistor, 2SC1740 (Q or R)	C1740 (Q or R)
Q511	Transistor, 2SC1740 (Q or R)	C1740 (Q or R)
Q512	Transistor, 2SC1740 (Q or R)	C1740 (Q or R)
Q513	Transistor, 2SC1740 (Q or R)	C1740 (Q or R)
Q514	Transistor, 2SC1740 (Q or R)	C1740 (Q or R)
Q515	Transistor, 2SC1740 (Q or R)	C1740 (Q or R)
	CAPACITORS	
C501	Cap. Electrolytic 47μF/16V	126C476
C502	Cap. Electrolytic 0.1μF/16V	126C476
C503	Cap. Ceramic 0.047μF/50V, ZF	12F3473
C504	Cap. Electrolytic 0.1μF/16V	126C476
C505	Cap. Electrolytic 1μF/50V	125F105
C506	Cap. Electrolytic 0.1μF/50V	126F104
C507	Cap. Electrolytic 0.1μF/50V	126F104
C508	Cap. Electrolytic 0.1μF/50V	126F104
C509	Cap. Mylar 0.1μF/50V, K	1250104
C510	Cap. Mylar 0.1μF/50V, K	1250104
C511	Cap. Electrolytic 100μF/16V	126C107
C512	Cap. Mylar 0.1μF/50V, K	1250104
C513	Cap. Mylar 0.1μF/50V, K	1250104
C514	Cap. Electrolytic 100μF/16V	126C107
C515		
C516	Cap. Electrolytic 2.2μF/50V	126F225
C517	Cap. Electrolytic 2.2μF/50V	126F225
C518	Cap. Electrolytic 0.1μF/50V	126F104
C519	Cap. Electrolytic 0.1μF/50V	126F104
C520	Cap. Electrolytic 10μF/16V	126C106
C521	Cap. Ceramic 220pF/50V, J	1270221
C522	Cap. Ceramic 220pF/50V, J	1270221
C523	Cap. Electrolytic 1μF/50V	126F105
C524	Cap. Electrolytic 0.47μF/50V	126474
C525	Cap. Ceramic 0.047μF/50V, ZF	12F3473
C526	Cap. Ceramic 0.047μF/50V, ZF	12F3473
C527	Cap. Ceramic 0.047μF, YB	12B3472
C528	Cap. Ceramic 0.001μF, YB	12B3102

Ref. No.	Description	Parts No.
	RESISTORS	
R501		
R502	Res. Carbon 390 ohm, 1/5W, J	132A391
R503	Res. Carbon 100 ohm, 1/5W, J	132A101
R504	Res. Carbon 100K ohm, 1/5W, J	132A104
R505	Res. Carbon 10K ohm, 1/5W, J	132A103
R506	Res. Carbon 47K ohm, 1/5W, J	132A473
R507	Res. Carbon 100 ohm, 1/5W, J	132A101
R508	Res. Carbon 82K ohm, 1/5W, J	132A823
R509	Res. Carbon 47K ohm, 1/5W, J	312A473
R510	Res. Carbon 27K ohm, 1/5W, J	132A273
R511	Res. Carbon 2.2K ohm, 1/5W, J	132A222
R512	Res. Carbon 220 ohm, 1/5W, J	132A221
R513	Res. Carbon 10K ohm, 1/5W, J	132A103
R514	Res. Carbon 47K ohm, 1/5W, J	132A473
R515	Res. Carbon 1K ohm, 1/5W, J	132A102
R516	Res. Carbon 1K ohm, 1/5W, J	132A102
R517	Res. Carbon 1K ohm, 1/5W, J	132A102
R518	Res. Carbon 10K ohm, 1/5W, J	132A103
R519	Res. Carbon 10K ohm, 1/5W, J	132A103
R520	Res. Carbon 10K ohm, 1/5W, J	132A103
R521	Res. Fuse 3.3 ohm, 1W, J	5363339
R522	Res. Carbon 100K ohm, 1/5W, J	132A104
R523	Res. Carbon 100K ohm, 1/5W, J	132A104
R524	Res. Carbon 100K ohm, 1/5W, J	132A104
R525	Res. Fuse 3.3 ohm, 1W, J	5363339
R526	Res. Carbon 100K ohm, 1/5W, J	132A104
R527	Res. Carbon 100K ohm, 1/5W, J	132A104
R528	Res. Carbon 82K ohm, 1/5W, J	132A822
R529	Res. Carbon 12K ohm, 1/5W, J	132A274
R530	Res. Carbon 279K ohm, 1/5W. J	132A274
R531	Res. Carbon 10K ohm, 1/5W, J	132A103
R532	Res. Carbon 10K ohm, 1/5W, J	132A103
R533	Res. Carbon 270K ohm, 1/5W, J	132A274
R534	Res. Carbon 10K ohm, 1/5W, J	132A103
R535	Res. Carbon 10K ohm, 1/5W, J	132A103
R536	Res. Carbon 10K ohm, 1/5W, J	132A103
R537	Res. Carbon 10K ohm, 1/5W, J	132A103
R538	Res. Carbon 47K ohm, 1/5W, J	132A473
R539	Res. Carbon 4.7K ohm, 1/5W, J	132A472
R540	Res. Carbon 1K ohm, 1/5W, J	132A102
R541	Res. Carbon 1K ohm, 1/5W, J	132A102
R542	Res. Carbon 1K ohm, 1/5W, J	132A102
R543	Res. Carbon 1K ohm, 1/5W, J	132A102
R544	Res. Carbon 470 ohm, 1/5W, J	132A471
R545	Res. Carbon 10K ohm, 1/5W, J	132A103
R546	Res. Carbon 10K ohm, 1/5W, J	132A103
R547	Res. Carbon 10K ohm, 1/5W, J	132A103
R548	Res. Carbon 82K ohm, 1/5W, J	132A823
R549	Res. Carbon 100K ohm, 1/5W, J	132A104
R550	Res. Carbon 1K ohm, 1/5W, J	132A105
R551	Res. Carbon 2.7K ohm, 1/5W, G	13[illegible]272
R552	Res. Carbon 24K ohm, 1/5W, G	13[illegible]243
R553	Res. Carbon 27K ohm, 1/5W, G	13[illegible]273
R554	Res. Carbon 1K ohm, 1/5W, G	13[illegible]102
R555	Res. Carbon 100K ohm, 1/5W, J	132A104

Ref. No.	Description	Parts No.
R556	Res. Carbon 100K ohm, 1/5W, J	132A104
R557	Res. Carbon 18K ohm, 1/5W, J	132A183
R558	Res. Carbon 22K ohm, 1/5W, J	132A223
R559	Res. Carbon 18K ohm, 1/5W, J	132A183
R560	Res. Carbon 22K ohm, 1/5W, J	132A223
R561	Res. Carbon 18K ohm, 1/5W, J	132A183
R562	Res. Carbon 22K ohm, 1/5W, J	132A223
R563	Res. Carbon 27K ohm, 1/5W, J	132A273
R564	Res. Carbon 27K ohm, 1/5W, J	132A273
R565	Res. Carbon 27K ohm, 1/5W, J	132A273
R566	Res. Carbon 18K ohm, 1/5W, J	132A183
R567	Res. Carbon 22K ohm, 1/5W, J	132A223
R568	Res. Carbon 1K ohm, 1/5W, J	132A102
R569	Res. Carbon 1K ohm, 1/5W, J	132A102
R570	Res. Carbon 1K ohm, 1/5W, J	132A102
R571	Res. Carbon 390 ohm, 1W, J	1330314
R572	Res. Carbon 100K ohm, 1/5W, J	132A104
R573	Res. Carbon 100K ohm, 1/5W, J	132A104
R574	Res. Carbon 100K ohm, 1/5W, J	132A104
R575	Res. Carbon 100K ohm, 1/5W, J	132A104
R576	Res. Carbon 100K ohm, 1/5W, J	132A104
R577	Res. Carbon 100K ohm, 1/5W, J	132A104
R578	Res. Carbon 100K ohm, 1/5W, J	132A104
R579	Res. Carbon 100K ohm, 1/5W, J	132A104
R580		
R581	Res. Carbon 100K ohm, 1/5W, J	132A104
R582	Res. Carbon 100K ohm, 1/5W, J	132A104
R583	Res. Carbon 100K ohm, 1/5W, J	132A104
R584	Res. Carbon 100K ohm, 1/5W, J	132A104
R585	Res. Carbon 100K ohm, 1/5W, J	132A104
R586	Res. Carbon 100K ohm, 1/5W, J	132A104
R587	Res. Carbon 100K ohm, 1/5W, J	132A104
	ICS	
IC501	IC L011417A	14L0101
IC502	IC BA6209	14L0106
IC503	IC BA6209	14L0106
QR501	IC DTC144S	DTC144S
QR502	IC DTC144S	DTC144S
QR503	IC DTC144S	DTC144S
	RESISTOR ARRAYS	
RX501	Res. Array RA7H 1/8 8R 473J or MRNSA-09P-473J	137E013 137E018
RX502	Res. Array RA7H 1/8 6R 473J or MRNSA-07P-473J	137E012 137E017
	CERAMICS	
X501	Ceramic OSC	1810501 or 1810518

Ref. No.	Description	Parts No.
	CONNECTORS	
CN9a	Connector (Base JAE IL-S) 2P	1740764
CN7	Connector (Base JAE IL-G) 3P	1740455
CN8		
CN9		
CN10	Connector (Base JAE IL-S) 10P	1740772
CN11		
CN12		
CN13	Connector (Base JAE IL-G) 3P	1740455
CL-C	Connector (Base JAE IL-S) 4P	1740766
CL-11	Connector (Base JAE IL-S) 8P	1740700
CL-N	Connector (Base JAE IL-S) 9P	1740771
CL-M	Connector (Base JAE IL-S) 11P	1740773
CL-15	Connector (Base JAE IL-G) 5P	1740457
	DIODES	
D501	Diode 1SS133	1SS133
D502	Diode 1SS133	1SS133
D503	Diode 1SR35-100A	1SR351-100A
D504	Diode 1SS133	1SS133
D505	Diode 1SS133	1SS133
D506	Diode 1SS133	1SS133
D507	Diode 1SS133	1SS133
D508	Diode 1SS133	1SS133
D509	Diode 1SS133	1SS133
D510	Diode Zener UZ-10BL or MTZ-10B	UZ10BL or MTZ-10B
D511	Diode 1SS133	1SS133
D512	Diode 1SS133	1SS133
D513	Diode 1SS133	1SS133
D514	Diode 1SS133	1SS133
D515	Diode 1SS133	1SS133
D516	Diode 1SS133	1SS133
D517	Diode 1SS133	1SS133

SCHEMATIC DIAGRAM (Tuner & Audio)

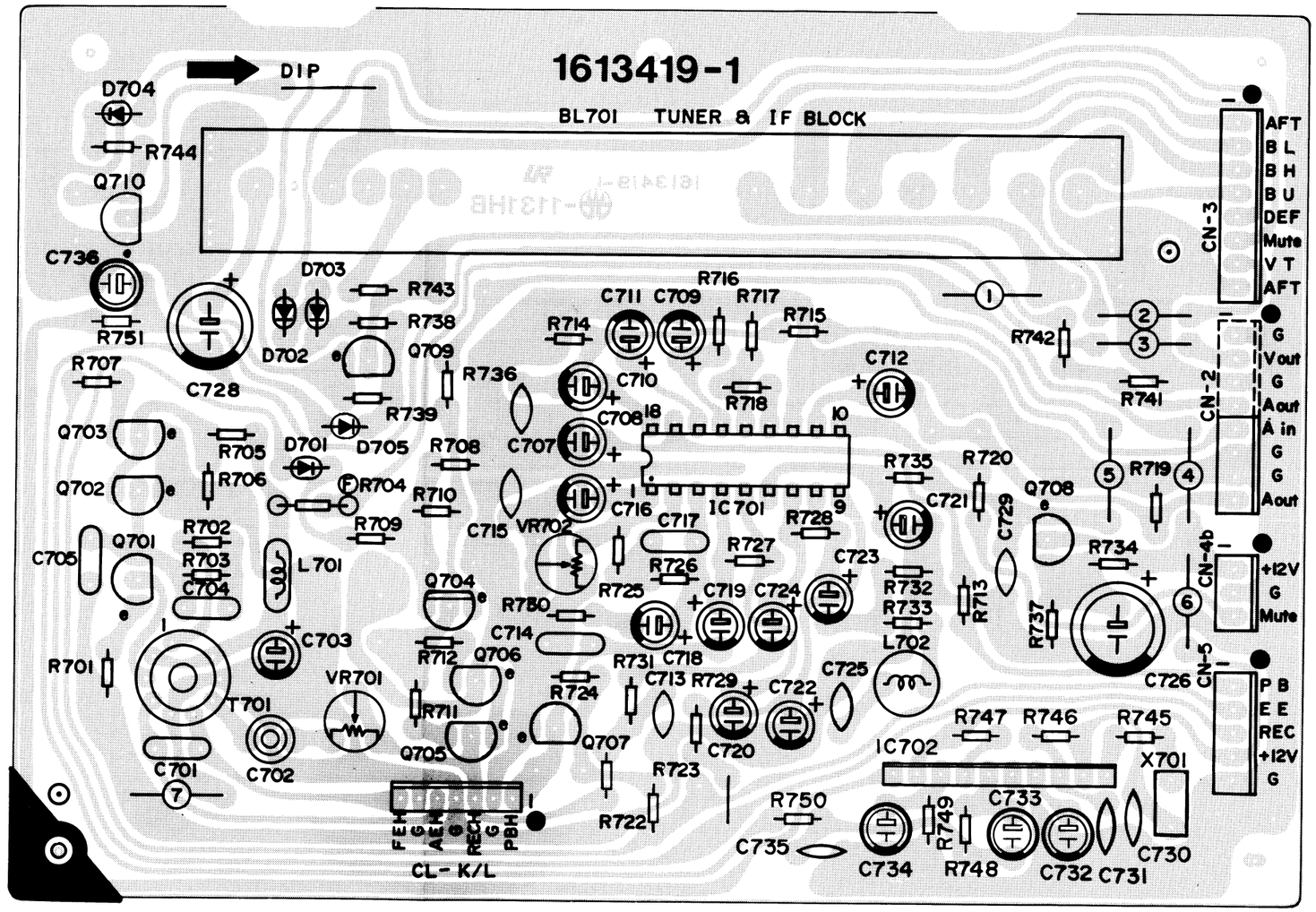


IC BLOCK DIAGRAM

BA5115

LA7210

P.C. Board (Audio & Tuner)

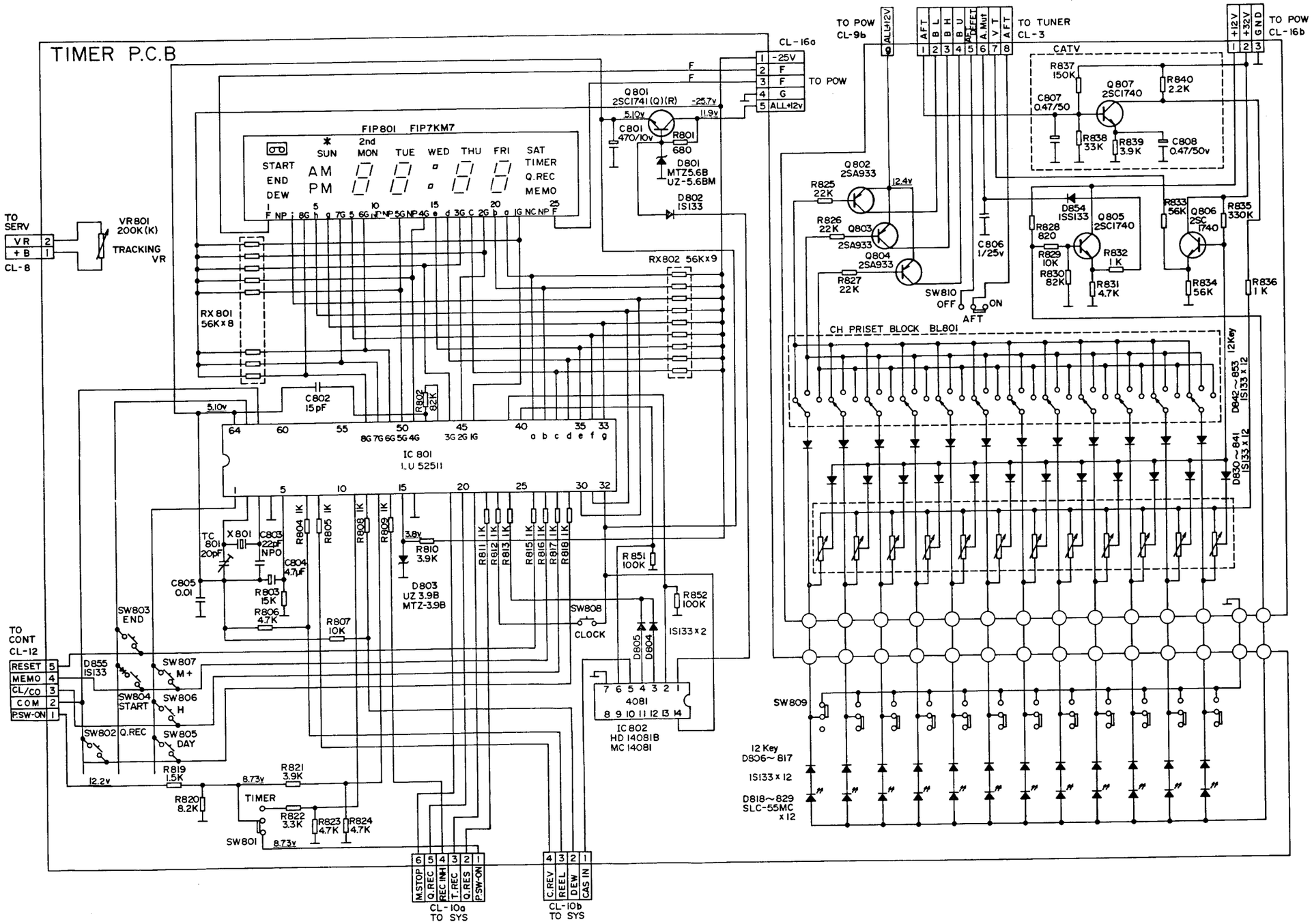


Tuner/Audio

Ref. No.	Description	Parts No.
	P.C.B., Tuner	1613319
CN-2	Connector base, IL-G, 8P (2.5mm)	1740460
CN-3	Connector base, IL-G, 8P (2.5mm)	1740460
CN-4b	Connector base, IL-G, 3P (2.5mm)	1740455
CN-5	Connector base, IL-G, 5P (2.5mm)	1740457
C701	Cap. mylar, 0.022 μF, 100V, J	1255223S
C702	Cap. p.p., 220 pF, 100V, J	2231221
C703	Cap. Electrolytic, 47/16V	626C476
C704	Cap. mylar, 0.01 μF, 50V, J	1254103S
C705	Cap. mylar, 0.022 μF, 50V, J	1254223S
C707	Cap. ceramic, 0.001 μF, 50V	12B3102
C708	Cap. Electrolytic, 1/16V	126C105
C709	Cap. Electrolytic, 47/6.3V	126A476
C710	Cap. Electrolytic, 1/16V	126C105
C711	Cap. Electrolytic, 33/10V	126B336
C712	Cap. Electrolytic, 10/16V	126C106
C713	Cap. ceramic 0.001 μF, 50V	12B3102
C714	Cap. mylar, 0.001 μF, 50V, J	1254102S
C715	Cap. mylar, 0.0033 μF, 50V, J	1254332S
C716	Cap. Electrolytic, 1/16V	126C105
C717	Cap. mylar, 0.01 μF, 50V, J	1254103S
C718	Cap. Electrolytic, 10/16V	126C106
C719	Cap. Electrolytic, 2.2/16V	126C225
C720	Cap. Electrolytic, 33/10V	126C336
C721	Cap. Electrolytic, 100/10V	126B107
C722	Cap. Electrolytic, 1/16V	126C105
C723	Cap. Electrolytic, 22/10V	126B226
C724	Cap. Electrolytic, 1/16V	126C105
C725	Cap. mylar, 0.027 μF, 50V, J	1254273S
C726	Cap. Electrolytic, 220/16V	626C227
C728	Cap. Electrolytic, 1000/6.3V	626A108
C729	Cap. ceramic, 0.022 μF	12F3223
C730	Cap. ceramic, 0.001 μF, 50V	12B3102
C731	Cap. ceramic, 330p	1270331
C732	Cap. Electrolytic, 0.47/50V	126F474
C733	Cap. Electrolytic, 1/25V	126D105
C734	Cap. Electrolytic, 1/25V	126D105
C735	Cap. ceramic, 0.001 μF, 50V	12B3102
D701	Diode, ISS133	ISS133
D702	Diode, ISS133	ISS133
D703	Diode, ISS133	ISS133
D704	Diode, ISS133	ISS133
X701	OSC, ceramic, KBR-500AH or , CSB500E5	1811103 181D414
Q701	Transistor, 2SC2060 (Q), (R)	C2060QR
Q702	Transistor, 2SC1740 (R), (S)	C1740RS
Q703	Transistor, 2SC1740 (R), (S)	C1740RS
Q704	Transistor, 2SA1038 (R), (S), (E)	A1038RSE
Q705	Transistor, 2SC2389 (R), (S), (E)	C2389RSE
Q706	Transistor, 2SC2389 (R), (S), (E)	C2389RSE
Q707	Transistor, 2SC1740 (R), (S)	C1740RS
Q708	Transistor, 2SC1740 (R), (S)	C1740RS
Q709	Transistor, 2SC1740 (R), (S)	C1740RS
Q710	Transistor, 2SC1740 (R), (S)	C1740RS
T701	Coil, osc	117D458

Ref. No.	Description	Parts No.
VR701	Res. semi-fixed, 100K ohm	
	KUSF637A-B-100K	138J785
	EVN-D4AA00B15	138N785
VR702	Res. semi-fixed, 20K ohm, B	138J782
	KUSF637A-B-20K ohm	138J782
	or EVN-D4AA00B24	138N782
BL701	Tuner/IF Block	1810573
IC701	I.C., BA5115	BA5115
IC702	I.C., LA7210	LA7210
R701	Res. carbon, 4.7 ohm, 1/5W, J	132A479
R702	Res. carbon, 100 ohm, 1/5W, J	132A101
R703	Res. carbon, 10K ohm, 1/5W, J	132A103
R704	Res. fuse, 39 ohm, 1/4W, G	5361390
R705	Res. carbon, 22K ohm, 15W, J	132A223
R706	Res. carbon, 10K ohm, 1/5W, J	132A103
R707	Res. carbon, 22K ohm, 1/5W, J	132A223
R708	Res. carbon, 56K ohm, 1/5W, J	132A563
R709	Res. carbon, 27K ohm, 1/5W, J	132A272
R710	Res. carbon, 10K ohm, 1/5W, J	132A103
R711	Res. carbon, 2.2K ohm, 1/5W, J	132A272
R712	Res. carbon, 2.2K ohm, 1/5W, J	132A272
R713	Res. carbon, 68K ohm, 1/5W, J	132A683
R714	Res. carbon, 5.6K ohm, 1/5W, J	132A562
R715	Res. carbon, 56K ohm, 1/5W, J	132A563
R716	Res. carbon, 1M ohm, 1/5W, J	132A105
R717	Res. carbon, 33K ohm, 1/5W, J	132A333
R718	Res. carbon, 10K ohm, 1/5W, J	132A103
R719	Res. carbon, 10K ohm, 1/5W, J	132A103
R720	Res. carbon, 68K ohm, 1/5W, J	132A683
R722	Res. carbon, 27K ohm, 1/5W, J	132A273
R723	Res. carbon, 3.3K ohm, 1/5W, J	132A332
R724	Res. carbon, 1K ohm, 1/5W, J	132A102
R725	Res. carbon, 12K ohm, 1/5W, J	132A123
R726	Res. carbon, 330K ohm, 1/5W, J	132A334
R727	Res. carbon, 100K ohm, 1/5W, J	132A104
R728	Res. carbon, 6.8K ohm, 1/5W, J	132A682
R729	Res. carbon, 68K ohm, 1/5W, J	132A683
R730	Res. carbon, 220 ohm, 1/5W, J	132A221
R731	Res. carbon, 1K ohm, 1/5W, J	132A102
R732	Res. carbon, 680 ohm, 1/5W, J	132A681
R733	Res. carbon, 270 ohm, 1/5W, J	132A271
R734	Res. carbon, 560 ohm, 1/5W, J	132A561
R735	Res. carbon, 150 ohm, 1/5W, J	132A151
R736	Res. carbon, 5.6K ohm, 1/5W, J	132A562
R737	Res. carbon, 1.8K ohm, 1/5W, J	132A182
R738	Res. carbon, 22K ohm, 1/5W, J	132A223
R739	Res. carbon, 10K ohm, 1/5W, J	132A103
R741	Res. carbon, 5.6K ohm, 1/5W, J	132A562
R743	Res. carbon, 22K ohm, 1/5W, J	132A223
R744	Res. carbon, 100K ohm, 1/5W, J	132A104
R745	Res. carbon, 750 ohm, 1/5W, J	132A751
R746	Res. carbon, 1K ohm, 1/5W, J	132A102
R747	Res. carbon, 18K ohm, 1/5W, J	132A183
R748	Res. carbon, 300K ohm, 1/5W, J	132A304
R749	Res. carbon, 75K ohm, 1/5W, J	132A753
R750	Res. carbon, 220 ohm, 1/5W, J	132A221
R751	Res. carbon, 22K ohm, 1/5W, J	132A223
L701	Coil, 100 μH, KOA-LF-101K	2162101S
L702	Coil, 12 mH, RX-9-123J	117D357
L703	Coil, 100 μH, KOA-LF-101	2162101

SCHEMATIC DIAGRAM (Timer)



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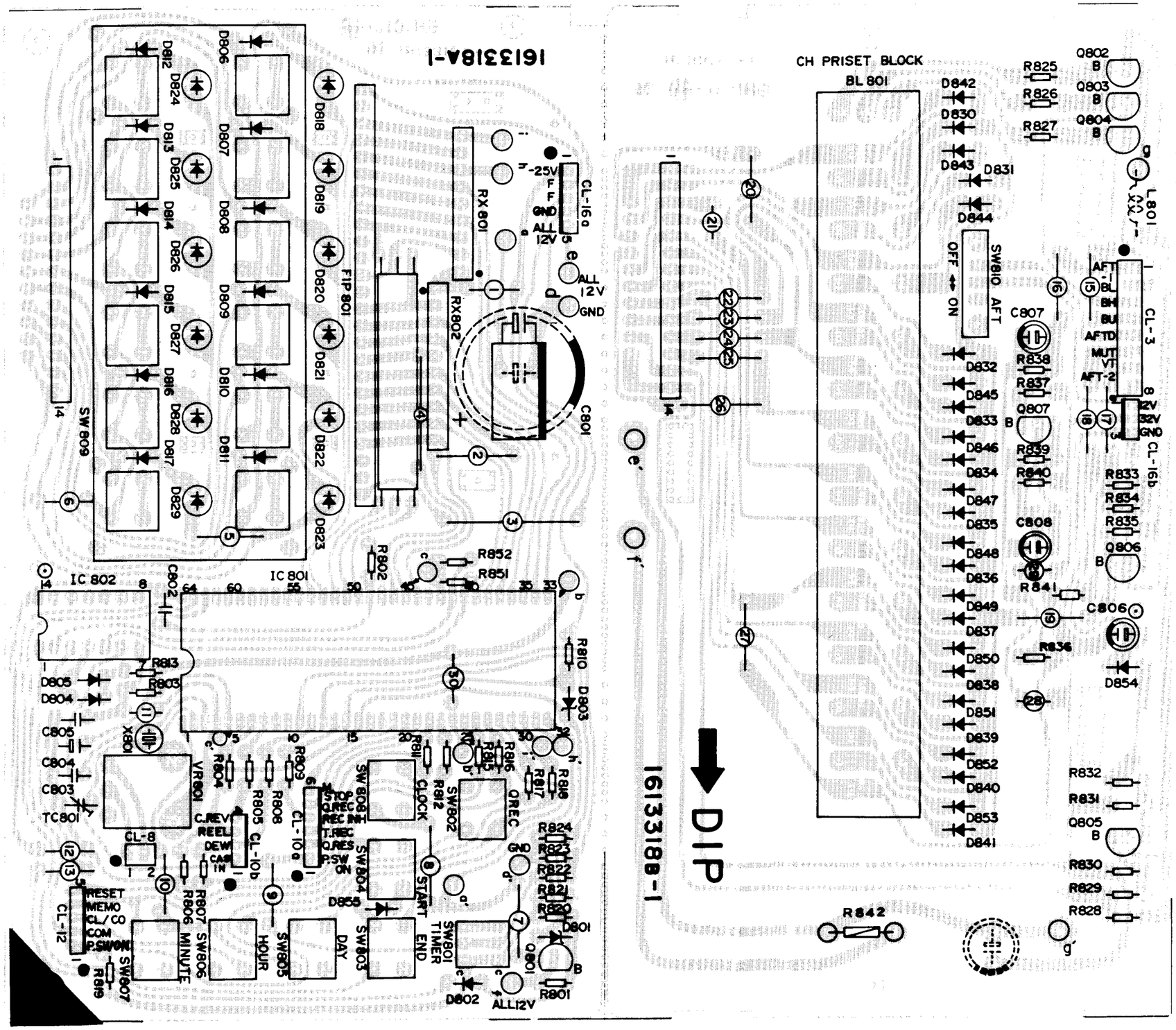
P.C. Board (Timer & Channel Preset)



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Timer

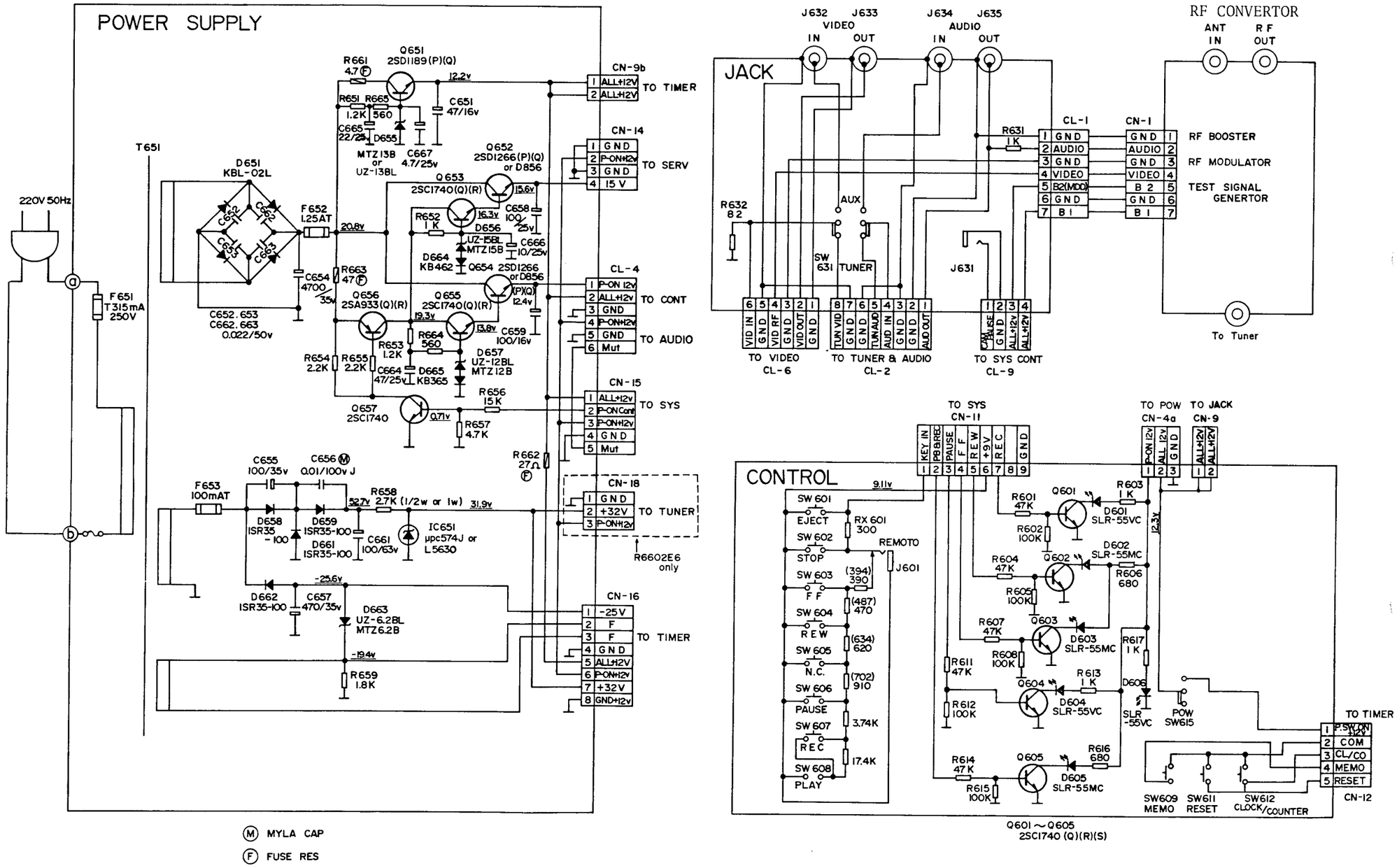
Ref. No.	Description	Parts No.
	P.C.B., Tuner, Timer	1613318
	Wire, jumper, 14P	1750710
IC801	I.C., LU52511	LU52511
IC802	IC., MC14081 or MN4081	MC14081
Q801	Transistor, 2SC1741 (Q) or (R)	C1741QR
Q802	Transistor, 2SA933 (Q) or (R)	A933QR
Q803	Transistor, 2SA933 (Q) or (R)	A933QR
Q804	Transistor, 2SA933 (R) or (R)	A933QR
Q805	Transistor, 2SC1740 (Q) or (R)	C1740QR
Q806	Transistor, 2SC1740 (Q) or (R)	C1740QR
Q807	Transistor, 2SC1740 (Q) or (R)	C1740QR
FIP801	Flourecent tube, FIP7KM7 or CP2132	1810565
		1810593
BL801	Meter unit, potention, 12 station	1810578
SW801	Switch, push, PS-150-A222A (Timer)	1622968
SW802	Switch, push, KHH10902 or	1622743
	(Q.Rec.) KHW0269-01-010 or	1622922
	EVQ-QSL04M	1622970
SW803	Switch, push, KHH10902 or	1622743
	(End) KHW0269-01-010 or	1622922
	EVQ-QSL04M	1622970
SW804	Switch, push, KHH10902 or	1622743
	(Start) KHW0269-01-010 or	1622922
	EVQ-QSL04M	1622970
SW805	Switch, push, KHH10902 or	1622743
	(Day) KHW0269-01-010 or	1622922
	EVQ-QSL04M	1622970
SW806	Switch, push, KHH10902 or	1622743
	(Hour) KHW0269-01-010 or	1622922
	EVQ-QSL04M	1622970
SW807	Switch, push, KHH10902 or	1622743
	(Minute) KHW0269-01-010 or	1622922
	EVQ-QSL04M	1622970
SW808	Switch, push, KHH10902 or	1622743
	(Clock) KHW0269-01-010 or	1622922
	EVQ-QSL-04M	1622970
SW809	Switch, unit, pre-setter, 12 station	1810576
SW810	Switch, slide, SLE-12-458 (AFT)	1621590
Q801	Transistor, 2SC1741 (Q) or (R)	C1741QR
Q805	Transistor, 2SC1740 (Q) or (R)	C1740QR
Q806	Transistor, 2SC1740 (Q) or (R)	C1740QR
C801	Cap. Electrolytic, 470 μF/10V	126B477
C802	Cap. Ceramic, 15 pF (J, SL) 50V	1270150
C803	Cap. Ceramic, 22 pF (NPO, J) 50V	12CN220
C804	Cap. Electrolytic, 4.7 μF/10V	526S475
C805	Cap. Ceramic, 0.01 μF	12F3103
C806	Cap. Electrolytic, 1 μF/25V	126D105
C807	Cap. Electrolytic, 0.47 μF/50V	526W474S
C808	Cap. Electrolytic, 0.47 μF/50V	526W474S
TC801	Trimmer, 20 p, CTC-6U-020 or	1280140
	, TZ03R200F	1280122
VR801	Res. Valiable, 200K	5290555

Ref. No.	Description	Parts No.
R801	Res. Carbon, 680 ohm, 1/5W, J	132A681
R802	Res. Carbon, 8.2K ohm, 1/5W, J	132A823
R803	Res. Carbon, 15K ohm, 1/5W, J	132A153
R804	Res. Carbon, 1K ohm, 1/5W, J	132A102
R805	Res. Carbon, 1K ohm, 1/5W, J	132A102
R806	Res. Carbon, 47K ohm, 1/5W, J	132A473
R807	Res. Carbon, 10K ohm, 1/5W, J	132A103
R808	Res. Carbon, 1K ohm, 1/5W, J	132A102
R809	Res. Carbon, 1K ohm, 1/5W, J	132A102
R810	Res. Carbon, 3.9K ohm, 1/5W, J	132A392
R811	Res. Carbon, 1K ohm, 1/5W, J	132A102
R812	Res. Carbon, 1K ohm, 1/5W, J	132A102
R813	Res. Carbon, 1K ohm, 1/5W, J	132A102
R815	Res. Carbon, 1K ohm, 1/5W, J	132A102
R816	Res. Carbon, 1K ohm, 1/5W, J	132A102
R817	Res. Carbon, 1K ohm, 1/5W, J	132A102
R818	Res. Carbon, 1K ohm, 1/5W, J	132A102
R819	Res. Carbon, 1.5K ohm, 1/5W, J	132A152
R820	Res. Carbon, 8.2K ohm, 1/5W, J	132A822
R821	Res. Carbon, 3.9K ohm, 1/5W, J	132A392
R822	Res. Carbon, 3.3K ohm, 1/5W, J	132A332
R823	Res. Carbon, 4.7K ohm, 1/5W, J	132A472
R824	Res. Carbon, 4.7K ohm, 1/5W, J	132A472
R825	Res. Carbon, 22K ohm, 1/5W, J	132A223
R826	Res. Carbon, 22K ohm, 1/5W, J	132A223
R827	Res. Carbon, 22K ohm, 1/5W, J	132A223
R828	Res. Carbon, 820 ohm, 1/5W, J	132A821
R829	Res. Carbon, 10K ohm, 1/5W, J	132A103
R830	Res. Carbon, 8.2K ohm, 1/5W, J	132A823
R831	Res. Carbon, 4.7K ohm, 1/5W, J	132A472
R832	Res. Carbon, 1K ohm, 1/5W, J	132A102
R833	Res. Carbon, 56K ohm, 1/5W, J	132A563
R834	Res. Carbon, 56K ohm, 1/5W, J	132A563
R835	Res. Carbon, 330K ohm, 1/5W, J	132A334
R836	Res. Carbon, 1K ohm, 1/5W, J	132A102
R837	Res. Carbon, 150K ohm, 1/5W, J	132A154S
R838	Res. Carbon, 33K ohm, 1/5W, J	132A333S
R839	Res. Carbon, 3.9K ohm, 1/5W, J	132A392S
R840	Res. Carbon, 2.2K ohm, 1/5W, J	132A222S
R851	Res. Carbon, 100K ohm, 1/5W, J	132A104
R852	Res. Carbon, 100K ohm, 1/5W, J	132A104
D801	Diode, Zener, UZ-5.6B	UZ-5.6B
D802	Diode, ISS133	ISS133
D803	Diode, Zener, UZ-3.9B	UZ-3.9B
D804	Diode, ISS133	ISS133
D805	Diode, ISS133	ISS133
D806	Diode, ISS133	ISS133
D807	Diode, ISS133	ISS133
D808	Diode, ISS133	ISS133
D809	Diode, ISS133	ISS133
D810	Diode, ISS133	ISS133
D811	Diode, ISS133	ISS133
D812	Diode, ISS133	ISS133
D813	Diode, ISS133	ISS133
D814	Diode, ISS133	ISS133
D815	Diode, ISS133	ISS133
D816	Diode, ISS133	ISS133
D817	Diode, ISS133	ISS133
D818	LED, Green, SLR-55MC5	1401149
D819	LED, Green, SLR-55MC5	1401149
D820	LED, Green, SLR-55MC5	1401149

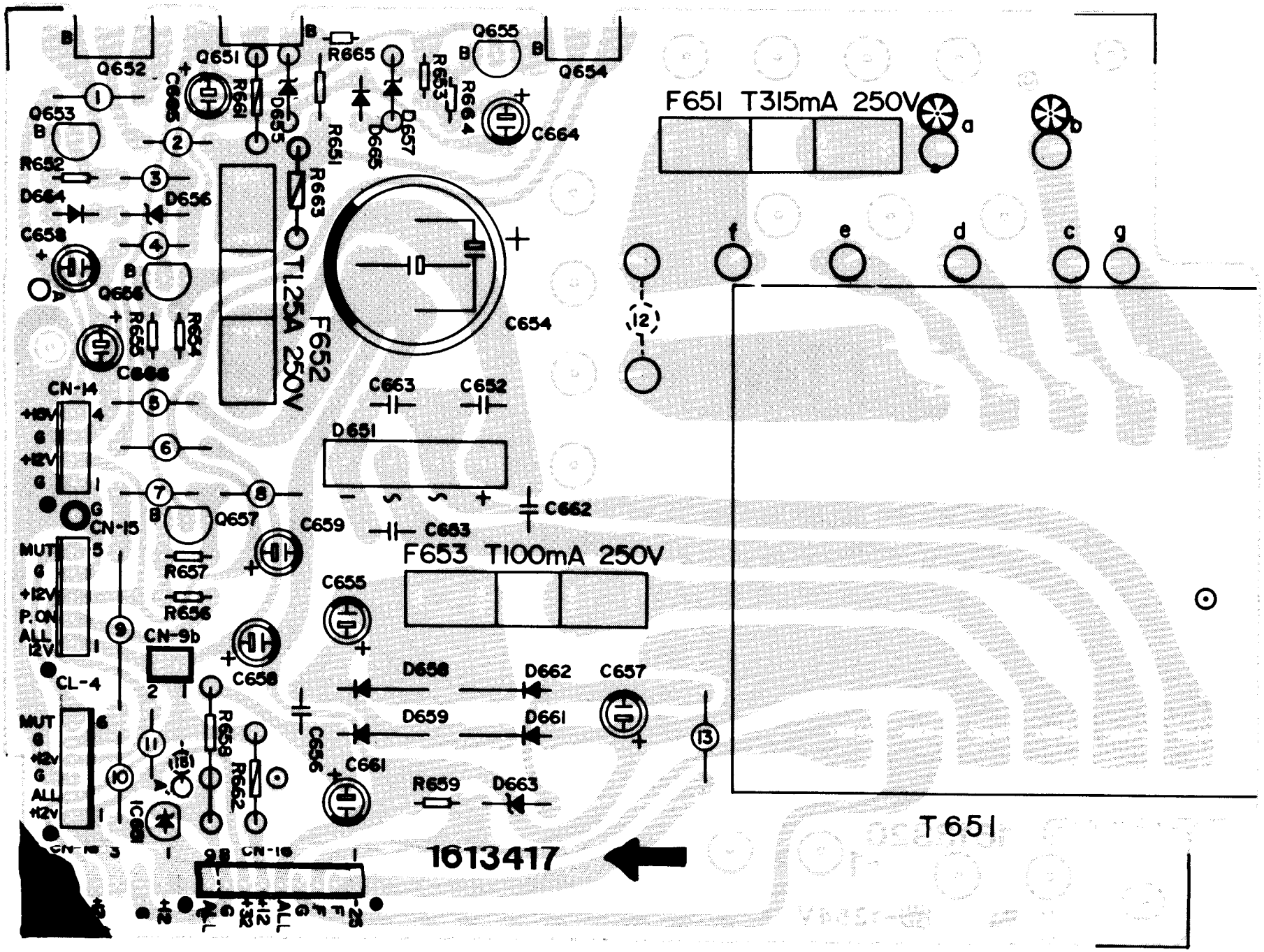
Ref. No.	Description	Parts No.
D821	LED, Green, SLR-55MC5	1401149
D822	LED, Green, SLR-55MC5	1401149
D823	LED, Green, SLR-55MC5	1401149
D824	LED, Green, SLR-55MC5	1401149
D825	LED, Green, SLR-55MC5	1401149
D826	LED, Green, SLR-55MC5	1401149
D827	LED, Green, SLR-55MC5	1401149
D828	LED, Green, SLR-55MC5	1401149
D829	LED, Green, SLR-55MC5	1401149
D830	Diode, ISS133	ISS133
D831	Diode, ISS133	ISS133
D832	Diode, ISS133	ISS133
D833	Diode, ISS133	ISS133
D834	Diode, ISS133	ISS133
D835	Diode, ISS133	ISS133
D836	Diode, ISS133	ISS133
D837	Diode, ISS133	ISS133
D838	Diode, ISS133	ISS133
D839	Diode, ISS133	ISS133
D840	Diode, ISS133	ISS133
D841	Diode, ISS133	ISS133
D842	Diode, ISS133	ISS133
D843	Diode, ISS133	ISS133
D844	Diode, ISS133	ISS133

Ref. No.	Description	Parts No.
D845	Diode, ISS133	ISS133
D846	Diode, ISS133	ISS133
D847	Diode, ISS133	ISS133
D848	Diode, ISS133	ISS133
D849	Diode, ISS133	ISS133
D850	Diode, ISS133	ISS133
D851	Diode, ISS133	ISS133
D852	Diode, ISS133	ISS133
D853	Diode, ISS133	ISS133
D854	Diode, ISS133	ISS133
D855	Diode, ISS133	ISS133
RX801	Res. Array, 56K ohm, 1/8W, J 8 Element	137E019 or 137W015
RX802	Res. Array, 56K ohm, 1/8W, J 9 Element	137E020 or 137E016
X801	X'tal, Osc, 32.768KHz, DT-38 or KF-38G	1811100 1811098

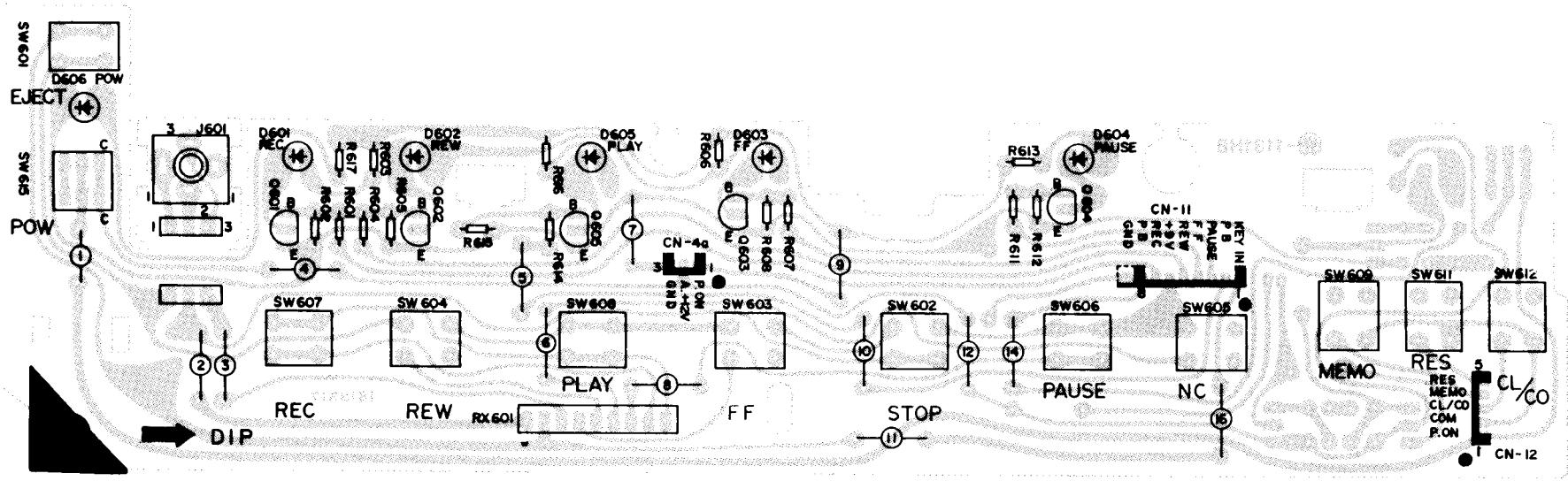
SCHEMATIC DIAGRAM (Power Supply, Control)



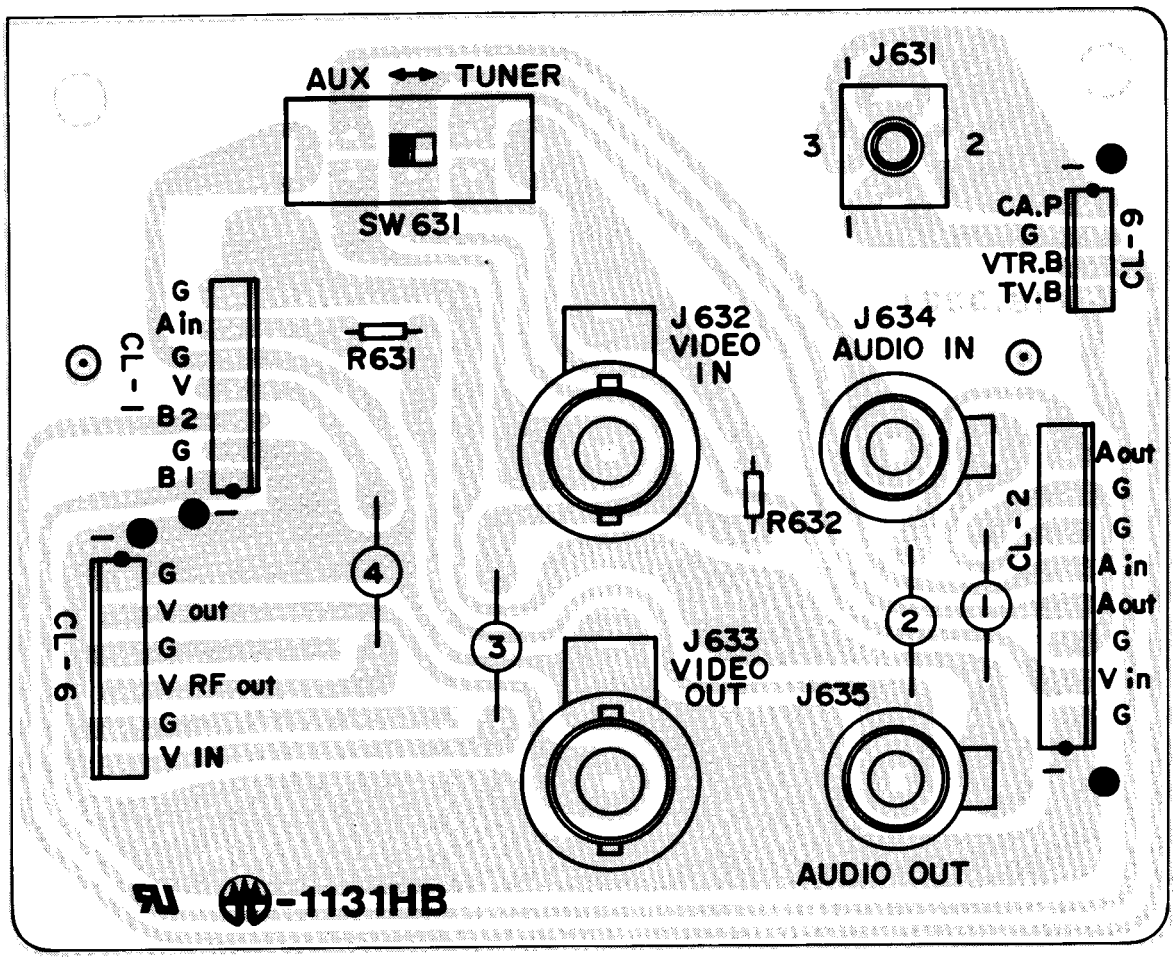
P.C. Board (Power Supply)



P.C. Board (Control)



P.C. Board (Jack)



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Power Supply

Ref. No.	Description	Parts No.
	P.C.B., Power Supply	1613417
R651	Res. Carbon, 1.2K ohm, 1/4WJ	1345122
R652	Res. Carbon, 1K ohm, 1/4WJ	1345102
R653	Res. Carbon, 1.2K ohm, 1/4WJ	1345122
R654	Res. Carbon, 2.2K ohm, 1/4WJ	1345222
R655	Res. Carbon, 2.2K ohm, 1/4WJ	1345222
R656	Res. Carbon, 15K ohm, 1/4WJ	1345153
R657	Res. Carbon, 4.7K ohm, 1/4WJ	1345472
R658	Res. Metal, 2.7K ohm, 1WJ	1330316
R659	Res. Carbon, 1.8K ohm, 1/4WJ	1345182
R661	Res. Fuse, 4.7 ohm, 1/4WJ	5361479
R662	Res. Fuse, 27 ohm, 1/4WJ	5361270
R663	Res. Fuse, 47 ohm, 1/4WJ	5361470
R664	Res. Carbon, 560 ohm, 1/4WJ	1345561
R665	Res. Carbon, 560 ohm, 1/4WJ	1345561
F651	Fuse, T 315 mA	1790434 or 1790095
F652	Fuse, T 1.25 A	1790440 or 1790087
F653	Fuse, T 100 mA	1790429 or 1790086
	Holder, Fuse	1790424
D651	Diode, KBL02L	KBL02L
D655	Diode, Zener UZ-13BL or MTZ13B	UZ-13BL MTZ13B
D656	Diode, Zener UZ-15BL or MTZ15BL	UZ-15BL
D657	Diode, Zener UL-12BL or MTZ12B	UZ-12BL MTZ12B
D658	Diode, 1SR35-100	1SR35-100
D659	Diode, 1SR35-100	1SR35-100
D661	Diode, 1SR35-100	1SR35-100
D662	Diode, 1SR35-100	1SR35-100
D663	Diode, Zener UZ-6.2BL or MTZ6.2B	UZ-6.2BL MTZ6.2B
D664	Diode, KB462	KB462
D665	Diode, KB365	KB365
C651	Cap. Electrolytic, 47μF/16V	626C476
C652	Cap. Ceramic, 0.022μF, 50V	12F3223
C653	Cap. Ceramic, 0.022μF, 50V	12F3223
C654	Cap. Electrolytic, 4700μF/35V	1220458 or 1220457
C655	Cap. Electrolytic, 100μF/35V	626E107
C656	Cap. Mylar, 0.01μF, 100VJ	1255103
C657	Cap. Electrolytic, 470μF/35V	626E477
C658	Cap. Electrolytic, 100μF/25V	626D107
C659	Cap. Electrolytic, 100μF/16V	626C107
C661	Cap. Electrolytic, 100μF/63V	626G107
C662	Cap. Ceramic, 0.022μF, 50V	12F3223
C663	Cap. Ceramic, 0.022μF, 50V	12F3223
C664	Cap. Electrolytic, 47μF/25V	126D476
C665	Cap. Electrolytic, 22μF/25V	126D226
C666	Cap. Electrolytic, 10μF/25V	126D106
C667	Cap. Electrolytic, 4.7μF/25V	126D475
IC651	I.C., μPC574J or L5630	μPC574J or L5630
Q651	Transistor, 2SD1189(P) or (Q)	D1189PQ
Q652	Transistor, 2SD856 (P) or (Q) or 2SD1266(P) or (Q)	D856PQ D1266PQ
Q653	Transistor, 2SC1740(Q) or (R)	C1740QR
Q654	Transistor, 2SD856 (P) or (Q) or 2SD1266(P) or (Q)	D856PQ D1266PQ
Q655	Transistor, 2SC1740(Q) or (R)	C1740QR
Q656	Transistor, 2SA933 (Q) or (R)	A933OR
Q657	Transistor, 2SC1740(Q) or (R)	C1740QR
CN-9b	Connector Base, IL-S, 2P	1740764
CN-14	Connector Base, IL-G, 4P	1740456
CN-15	Connector Base, IL-G, 5P	1740457
CN-16	Connector Base, IL-S, 8P	1740770
CN-18	Connector Base, IL-G, 3P	174045
	Connector Pin, 1P, RT-01T-1.3B	1720688
T651	Transformer, 220 Volt	115N287
	AC Cord	1750236

Control

Ref. No.	Description	Parts No.
	P.C.B.,Control	1613317
SW601	Push Switch, KHH10902 or	1622743
	(Eject) KHW0269-01-010 or	1622922
	EVQ-QSL04M	1622970
SW602	Push Switch, KHH10902 or	1622743
	(Stop) KHW0269-01-010 or	1622922
	EVQ-QSL04M	1622970
SW603	Push Switch, KHH10902 or	1622743
	(F.F.) KHW0269-01-010 or	1622922
	EVQ-QSL04M	1622970
SW604	Push Switch, KHH01902 or	1622743
	(Rew.) KHW0269-01-010 or	1622922
	EVQ-QSL04M	1622970
SW605	Push Switch, KHH10902 or	1622743
	(N.Cancel) KHW0269-01-010 or	1622922
	EVQ-QSL04M	1622970
SW606	Push Switch, KHH10902 or	1622743
	(Pause) KHW0269-01-010 or	1622922
	EVQ-QSL04M	1622970
SW607	Push Switch, KHH10902 or	1622743
	(Rec.) KHW0269-01-010 or	1622922
	EVQ-QSL04M	1622970
SW608	Push Switch, KHH10902 or	1622743
	(Play) KHW0269-01-010 or	1622922
	EVQ-QSL04M	1622970
SW609	Push Switch, KHH10902 or	1622743
	(Memo) KHW0269-01-010 or	1622922
	EVQ-QSL04M	1622970
SW611	Push Switch, KHH10902 or	1622743
	(Reset) KHW0269-01-010 or	1622922
	EVQ-QSL04M	1622970
SW612	Push Switch, KHH10902 or	1622743
	(Clock/ KHW0269-01-010 or	1622922
	Counter) EVQ-QSL04M	
SW615	Push Switch, PS-150-A225A (Power)	1622968
J601	Jack, Remote Control ϕ2.5	1630312
D601	LED, Red, REC. SLR-55V05	1401219
D602	LED, Green, REW. SLR-55M05	1401149
D603	LED, Green, F.F. SLR-55M05	1401149
D604	LED, Red, PAUSE SLR-55V05	1401219
D605	LED, Green, PLAY SLR-55M05	1401149
D606	LED, Red, POWER SLR-55V05	1401219

Ref. No.	Description	Parts No.
Q601	Transistor, 2SC1740(Q) or (R) or (S)	C1740QRS
Q602	Transistor, 2SC1740(Q) or (R) or (S)	C1740QRS
Q603	Transistor, 2SC1740(Q) or (R) or (S)	C1740QRS
Q604	Transistor, 2SC1740(Q) or (R) or (S)	C1740QRS
Q605	Transistor, 2SC1740(Q) or (R) or (S)	C1740QRS
Q606	Transistor, 2SA933 (Q) or (R)	A933QR
Q608	Transistor, 2SC1740(Q) or (R) or (S)	C1740QRS
R601	Res. Carbon, 47K ohm, 1/5WJ	132A473
R602	Res. Carbon, 100K ohm, 1/5WJ	132A104
R603	Res. Carbon, 1K ohm, 1/5WJ	132A102
R604	Res. Carbon, 47K ohm, 1/5WJ	132A473
R605	Res. Carbon, 100K ohm, 1/5WJ	132A104
R606	Res. Carbon, 680 ohm, 1/5WJ	132A681
R607	Res. Carbon, 47K ohm, 1/5WJ	132A473
R608	Res. Carbon, 100K ohm, 1/5WJ	132A104
R611	Res. Carbon, 47K ohm, 1/5WJ	132A473
R612	Res. Carbon, 100K ohm, 1/5WJ	132A104
R613	Res. Carbon, 1K ohm, 1/5WJ	132A102
R614	Res. Carbon, 47K ohm, 1/5WJ	132A473
R615	Res. Carbon, 100K ohm, 1/5WJ	132A104
R616	Res. Carbon, 680 ohm, 1/5WJ	132A681
R617	Res. Carbon, 1K ohm, 1/5WJ	132A102
CN-4a	Connector Base, IL-S, 3P	1740716
CN-9b	Connector Base, IL-S, 2P	1740715
CN-11	Connector Base, 8P	1740781
CN-12	Connector Base, 5P	1740719
	Wire, CP Jumper, 3P	1750711
RX601	Resist array, RNSS-09Q-DA1/D0-01	137G014

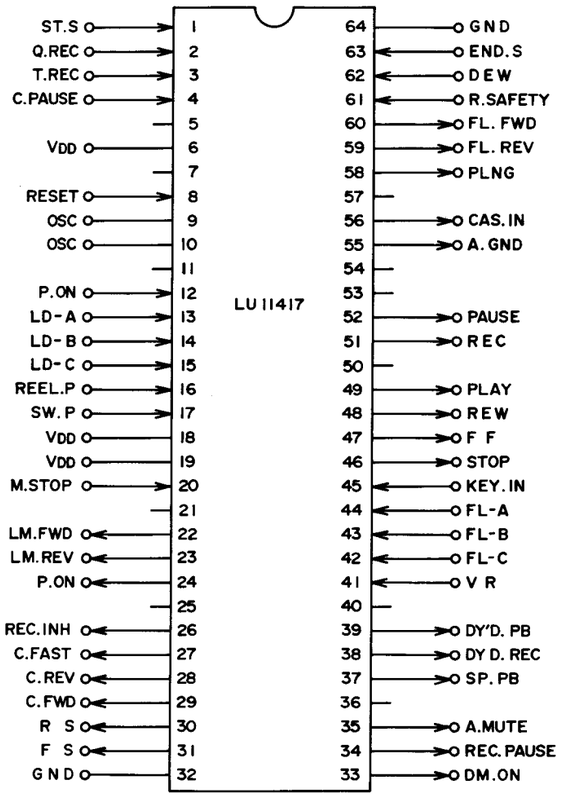
JACK P.C.B.

Ref. No.	Description	Parts No.	Ref. No.	Description	Parts No.
	P.C.B., jack	1613321	R632	Res. carbon, 82 ohm, 1/5WJ	132A820
SW631	Switch, slide, SLG-22-455	1621589		RF Convertor, PAL G W/CATV	1810606
				RF Convertor, PAL G	1810569
J631	Jack, camera remote, ϕ2.5	1630312		RF Convertor, PAL I	1810570
J632	Terminal board	1730470		RF Convertor, PAL B	1810571
J633					
J634				Coxial cable with RCA plug, 110mm	1750713 or 1750667
J635				or, 130mm	1750714
R631	Res. carbon, 1K ohm, 1/5WJ	132A102			

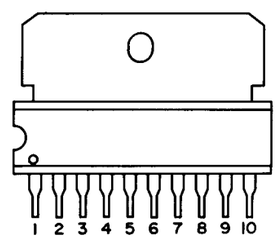
IC. TRANSISTOR TERMINAL VIEW
(System Control)

1. I C

LU 11417 IC501



BA6209 IC502.503

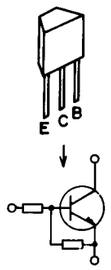


PIN NO	ASSIGNMENT	PIN NO	ASSIGNMENT
1	G N D	6	R IN
2	V out 1	7	V cc 1
3	V z 1	8	V cc 2
4	V R	9	V z 2
5	F IN	10	V out 2

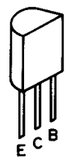
2. TRANSISTOR

2SC1740
Q502, 503, 509
510, 511, 512
513, 514, 515

2SA933
Q505, 506
507, 508



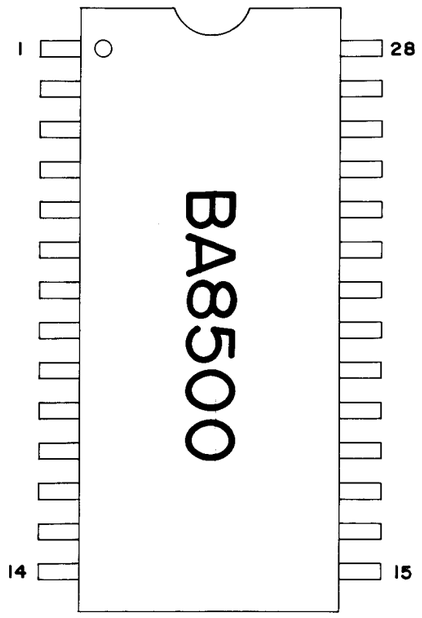
DTC 144
QR501, 502
503



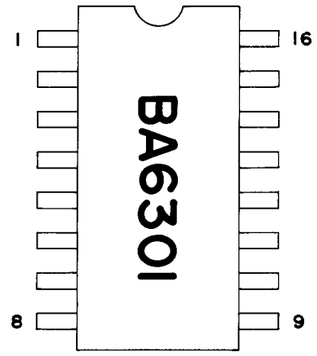
2SD1292
Q501, 504

LEAD IDENTIFICATION
(IC, Transistor) [Servo]

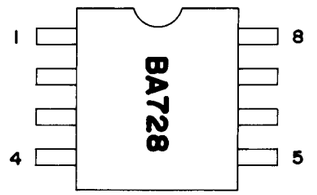
BA8500 ; IC 301



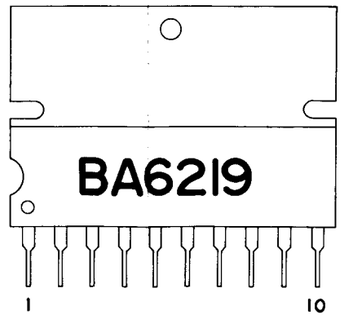
BA6301 ; IC 302,303



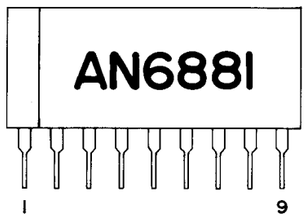
BA728 ; IC 304



BA6219 ; IC 306



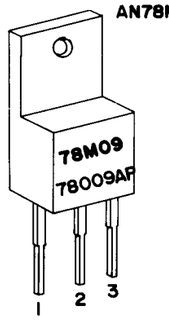
AN6881 ; IC 305



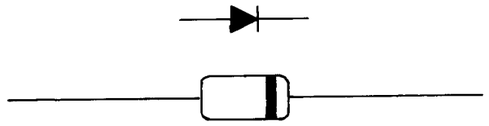
2SA933R, 2SA1740R;

Q301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 322, 323, 324, 325, 326, 327, 328, 329, 331

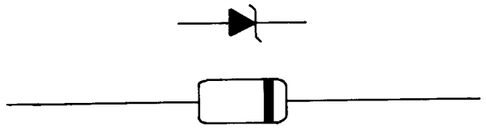
AN78M09
OR TA78009AP;
IC 307



LEAD IDENTIFICATION
(IC, Transistor, Diode, LED) [Video Part]

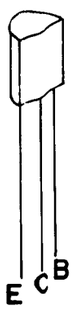


D1,2,3,4,5,6,7,8,9,11,
13,15,18 ;1SS133

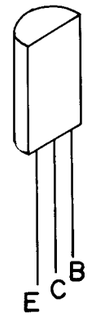


D17 ;MTZ9.1C

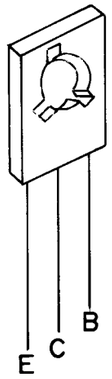
Q1,2,5,6,7,8,9,11,12,14,15,16,
17,18,19,23,24,25,27,28,30,
31,32,33,34,36,37,38,40,41,
47,48 ;2SC1740S
Q10,13,20,21,29,35,45,46,49
;2SA933S



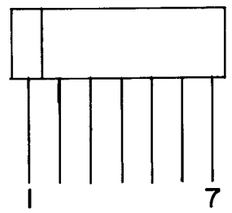
Q3,4 ;2SC535B
Q44 ;2SA854R



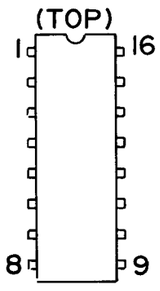
Q42 ;2SC2060Q



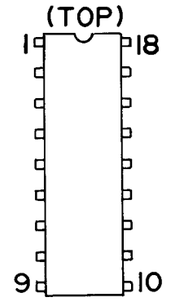
Q43 ;2SD1380Q



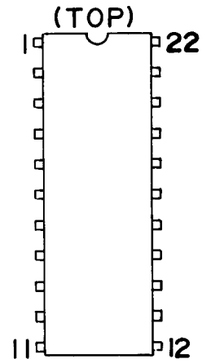
IC8 ;AN6342N



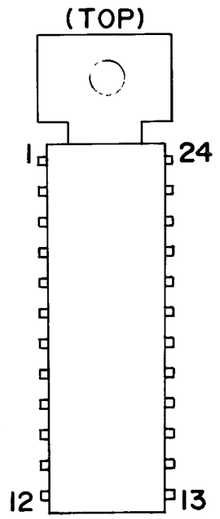
IC6 ;AN6371



IC4 ;AN6360
IC5 ;AN6362



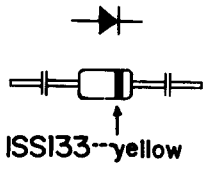
IC3 ;AN6306



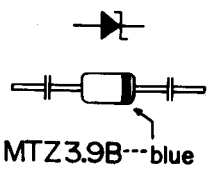
IC1 ;CX134
IC2 ;CX135

LEAD IDENTIFICATION
(IC, Transistor, Diode, LED)
[Control, Audio, Timer, Power Supply]

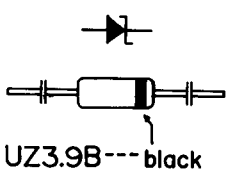
Control Audio
Timer Power Supply



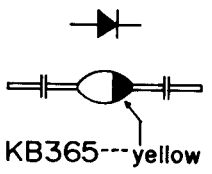
ISS133---yellow



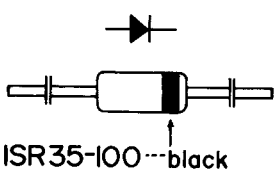
MTZ3.9B---blue
MTZ5.6B---blue
MTZ6.2B---blue
MTZ12B---blue
MTZ13B---blue
MTZ15B---blue



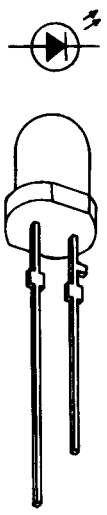
UZ3.9B---black
UZ5.6BM--black
UZ6.2BL--black
UZ12BL--black
UZ13BL--black
UZ15BL--black



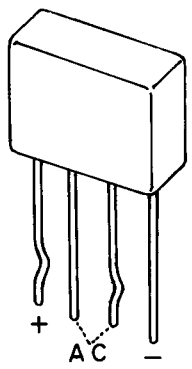
KB365---yellow
KB462---orange



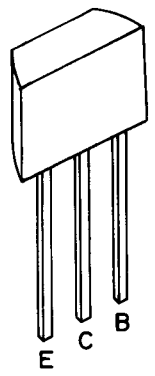
ISR35-100---black



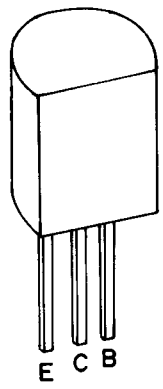
SLR-55MC5····green
SLR-55VC5····red



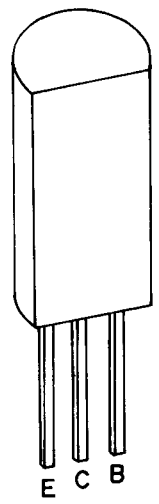
KBL02L



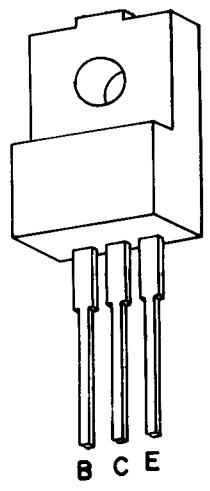
2SA933
2SC1740
2SC1741



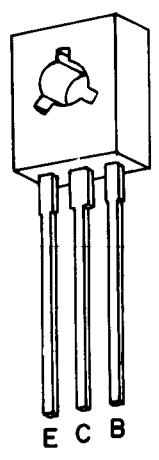
2SA1038
2SC2389



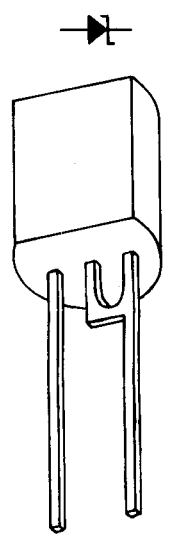
2SC2060



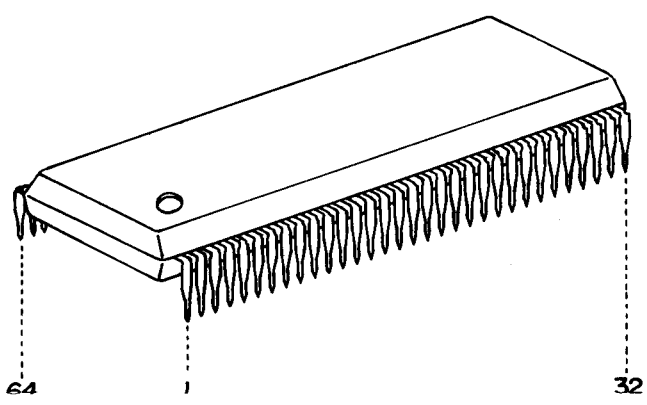
2SD856 or
2SD1266



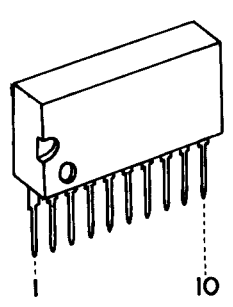
2SD1189



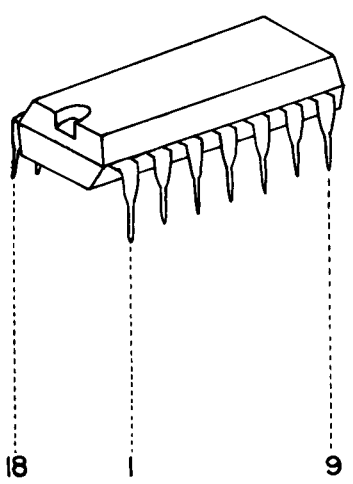
μPC574J or
L5630



LU52511



LA7201



BA5115---- 18 1 9

MC14081 or---- 14 1 7
MN 4081

Section 2
Mechanical Description

1. TAPE TRANSPORT SYSTEM

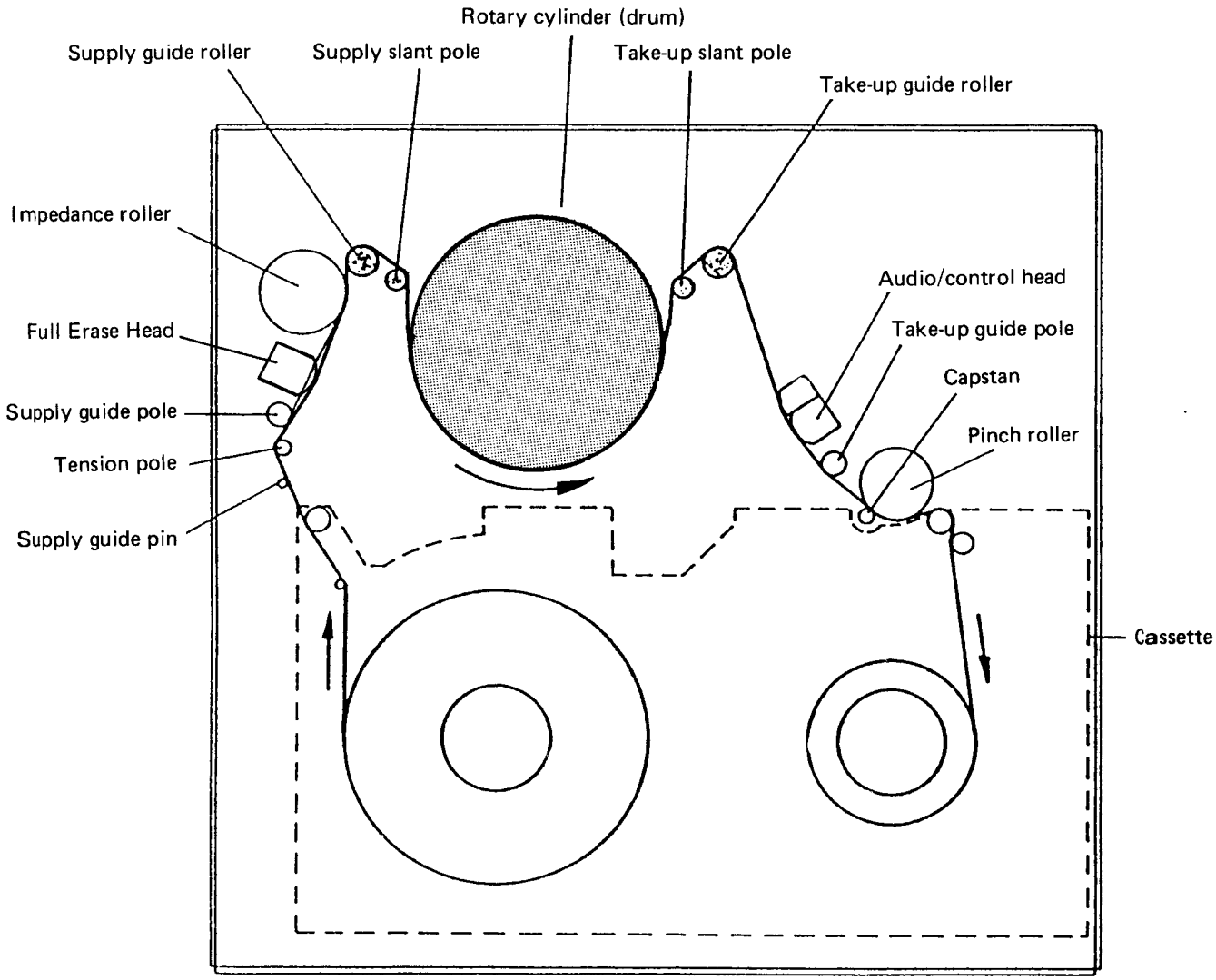


Fig. 1 Tape transport system

As the designation implies, the most basic function of this system is to transport the tape past the audio and video heads at the specified speed. However, since this model is a helical scan cassette type machine, numerous addition functions are required, which include extracting the tape from the cassette, wrapping it about the cylindrical head drum at a precisely defined angle, and returning the tape to the cassette after it is no longer needed.

To ensure smooth operation, conformance with VHS specifications and "interchangeability" (which allows a tape recorded by one machine to be played by another machine of the same format), the positions, heights and inclination angles of the various fixed and movable tape guides must be adjusted and maintained to close tolerances. The most stringent and difficult of these adjustments have been performed at the factory under controlled conditions. Therefore, in service, it is usually only necessary to perform minor adjustments to compensate for wear and after replacing certain internal parts.

The following description covers the mechanical states for the various operating modes. An adequate understanding of the mechanical processes is essential before attempting to repair or adjust the transport system.

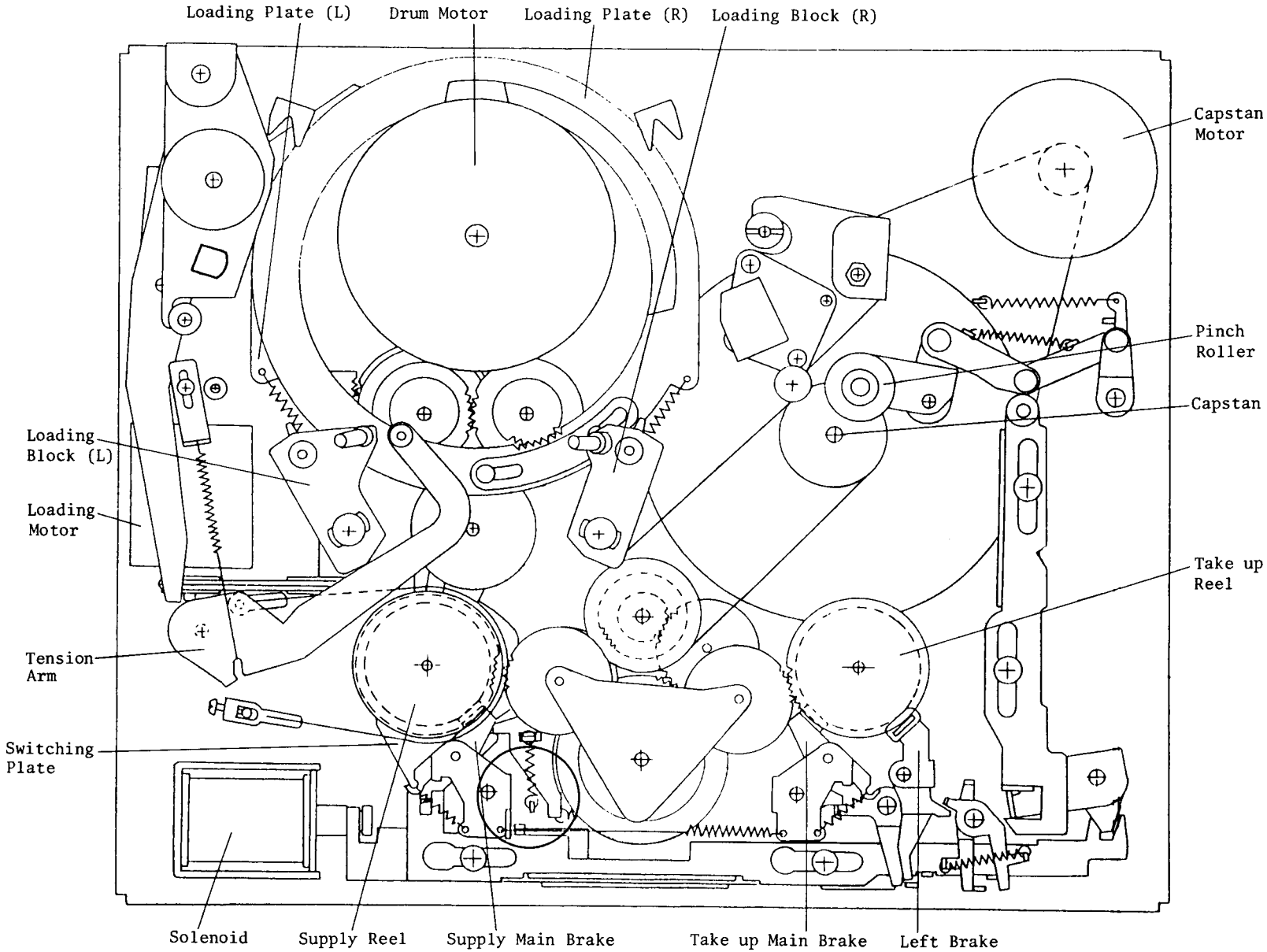


Figure 2 Main Parts Location

2. FUNCTIONS OF MAIN PARTS

2-1 Drum Motor
Rotates the video head.

2-2 Capstan Motor
Rotates the capstan, take-up reel and supply reel (Fig. 3)

1. The rotation of the capstan motor drives the capstan flywheel by means of the main belt, which then rotates the capstan.
2. The rotation of the capstan flywheel is transmitted to the RF clutch via the drive belt. The clutch assembly is rotated via the PLAY gear of FF gear which is geared with the RF clutch. The rotation of the clutch assembly drives the right and left reel drive gears mounted on the gear plate. Since the gear plate is then rotated toward the rotational direction of the reel drive gears, the take-up reel or supply reel is geared with the rotated by the reel drive gears.

2-3 Loading Motor
Power is transmitted to the worm and the loading drive gear (A) via the loading belt and:

1. Drives the loading plate (Fig. 4)
   The loading plate (L) is driven via the loading drive gear (A) and next via the loading drive gear (B). The loading plate (R) is also driven via the loading drive gear (B) and then via the joint gears (A) and (B).
2. Controls the brakes (Fig. 5)
   The rotational power is transmitted from the loading drive gear (A) to the control gear, interlocking plate and interlocking gear. Then the switching plate is rotated, the main plate is slided, and each brake is actuated.
3. Controls the pinch roller (Fig. 5)
   The sliding of the pressure plate as mentioned in 3. also allows the pinch roller arm to be actuated via the toggle arm, which results in controlling the pinch roller.
4. Selects the rotational frequency of the reel (Fig. 6)
   The rotation of the switching plate drives the change plate via the change plate driving arm. The revolving speed of the reel is selected by changing the gear which clutches with the RF clutch. (The PLAY gear and FF gear are mounted on the change plate and clutched with the clutch assembly.)

2-4 Plunger
Drives the supply main brake and the take-up main brake by the pull plate which is interlocked with the plunger in the FF and REW modes (Fig. 7)

2-5 Loading Switch
Detects the position of mode in order to control the above driving components (Fig. 8)

3. EXPLANATIONS OF MODES

3-1 Stop Mode (Fig. 9)
When a cassette tape can be put in or taken out, the motor and the plunger are not working. When a cassette tape is put in, the loading blocks (L) and (R) as well as the tension pole position in the inside of the tape so that the tape may be reeled out of the cassette. Also the capstan position in the inside of the tape. The pinch roller is separated from the capstan so as not to contact with it when a cassette tape is put in or taken out. The take-up main brake, left brake and supply main brake are actuated to prevent the take-up and supply reels from rotating freely.

3-2 Loading Mode (Fig. 10)

In this mode, the tape is reeled out of the cassette and set at the position of PLAY mode. The pressing of the PLAY button permits the drum motor, capstan motor and loading motor to start rotating. The supply main brake is separated from the supply reel and eject is locked, because of the rotation of the loading motor. The capstan motor slips in the clutch assembly and thus the reel does not rotate because the take-up reel is braked. The loading plates (R) and (L) start working and the tape is reeled out of the cassette by the loading blocks (R) and (L). The loading blocks proceed along the guide slits of the loading base and are pressed to the pole guide.

During this operation, the tension arm is driven, following the movements of the loading block (L) and then the back tension return arm. (The back tension return arm is actuated by the back tension return bar, which is driven by the guide roller of the low disc plate (L).)

The back tension band is pulled by the tension arm and contacts with the supply reel. which results in applying back tension. For this reason, the tension arm stays at the position that the tensile strength of the tape is balanced with the strength of the tension arm spring, separating from the back tension arm. Then the take-up main brake and the left brake separate from the take-up reel, and the reel starts rotating. At the same time, the loading switch which is used to permit the pinch roller to be pressed to the capstan, detects the PLAY mode and the loading motor is stopped.

3-3 PLAY, CUE and REVIEW Mode (Fig. 11)

3-4 Unloading Mode (Fig. 10)

When the tape comes to its end during PLAY mode or when the stop button is pressed, the loading motor starts rotating reversely. Then the pinch roller separates from the capstan and the take-up reel is braked. The drum motor is turned off. Simultaneously, the capstan motor reversely rotates and the supply reel starts rotating. The loading blocks (R) and (L) and the tension arm are driven as in the reverse of the loading mode, and the tape is reeled on the supply reel. After the tape is reeled, the supply main brake is applied, the eject lock is released, and each motor is stopped.

3-5 FF and REW Modes (Fig. 12)

When the FF (REW) button is pressed, the loading motor starts rotating, the FF gear is clutched with the RF clutch (the PLAY gear is released), the left brake is detached from the take-up reel, and eject is locked. When the loading switch detects the FF (REW) mode, the loading motor is stopped. Then the switch for the plunger is turned on and the take-up and supply main brakes are detached from the reel. At the same time, the capstan motor rotates in accordance with the direction for FF or REW. The rotation of the gear plate drives the take-up reel or the supply reel. When the stop button is pressed during the FF (REW) mode, the switches for the capstan motor and the plunger are turned off, resulting in braking. Then the loading motor starts rotating, and stops after the STOP mode is selected. This operation permits eject lock to be released.

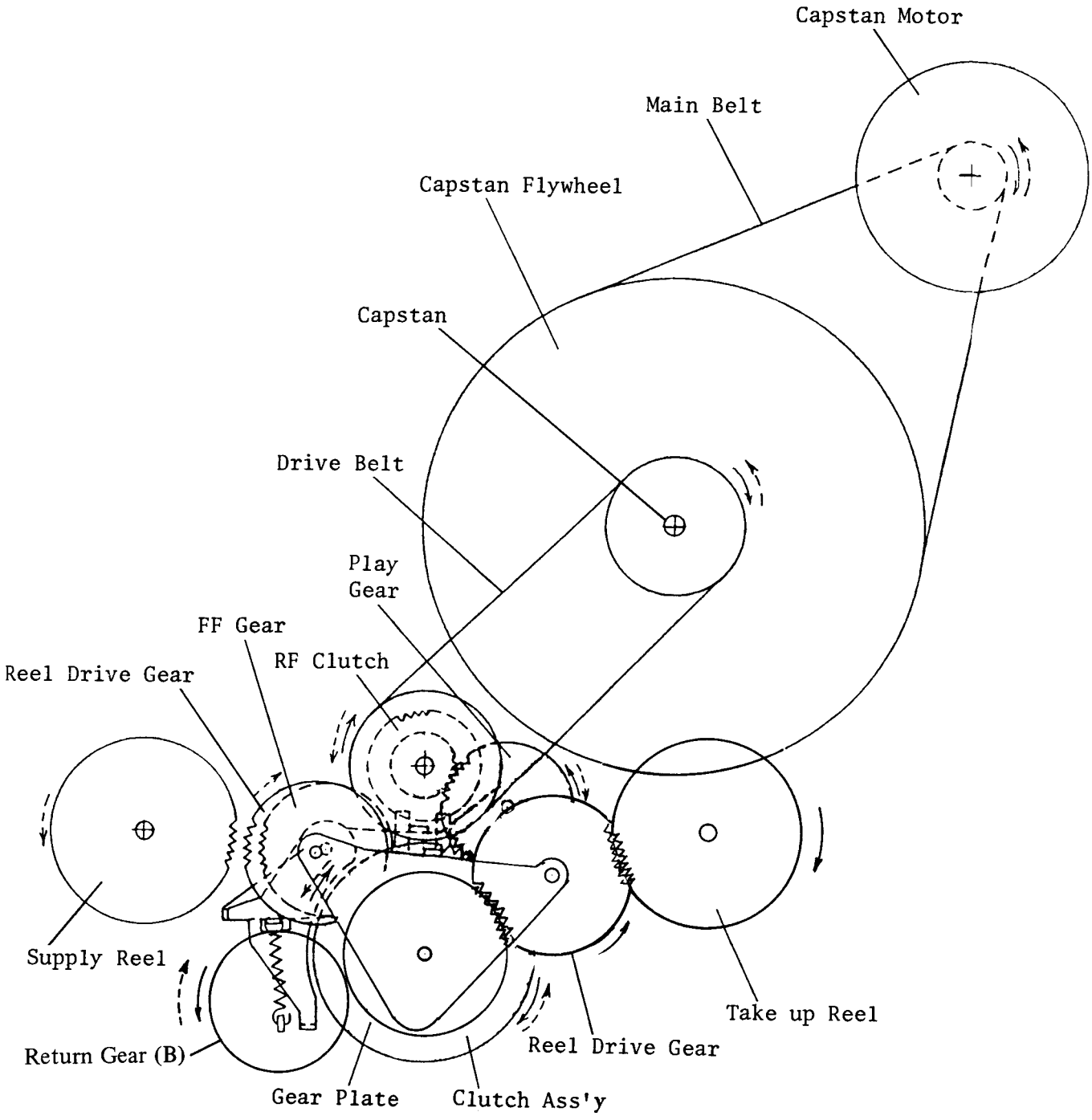


Fig. 3 Capstan Motor Performance

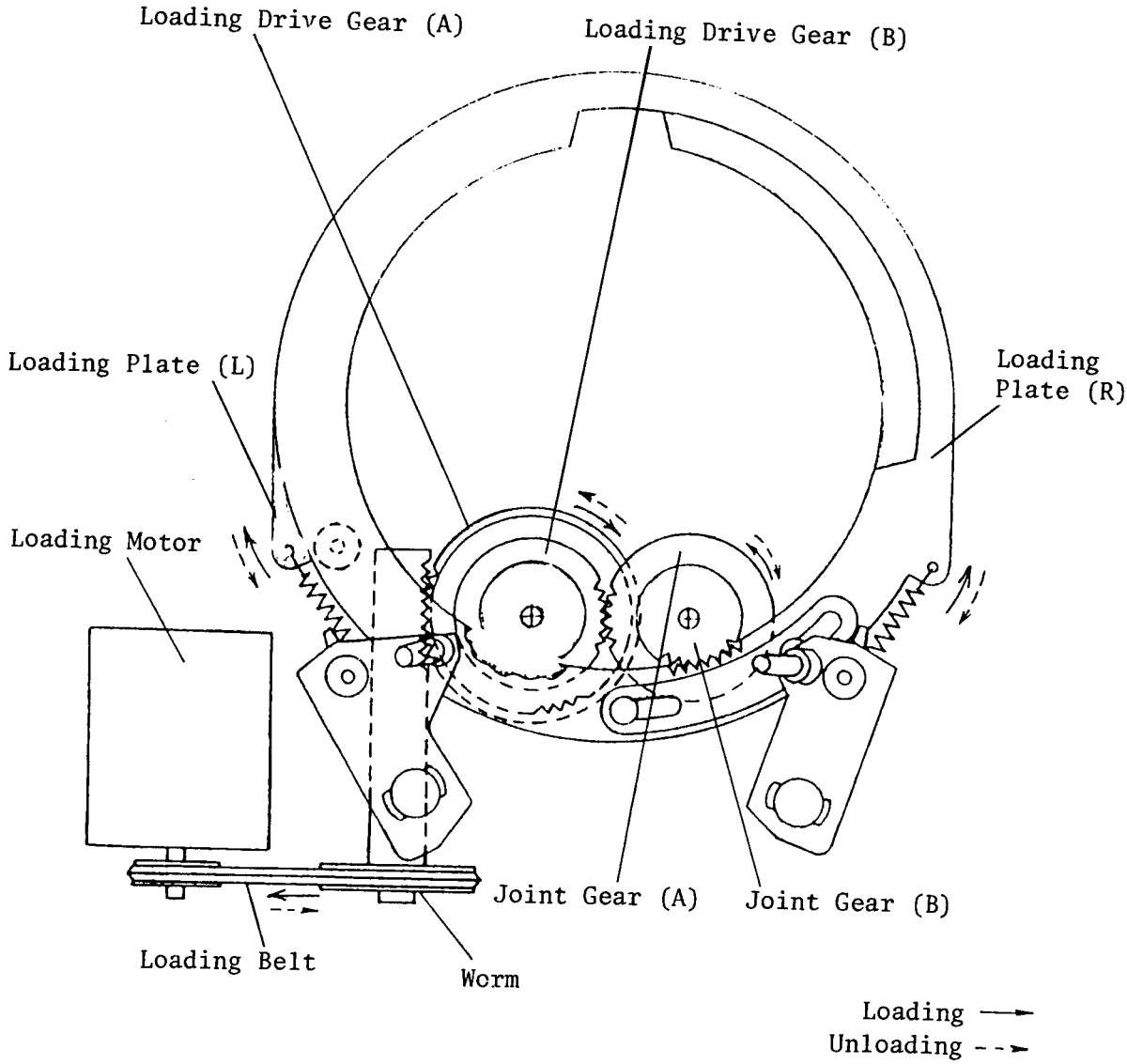


Fig. 4 Loading Plate Mechanism

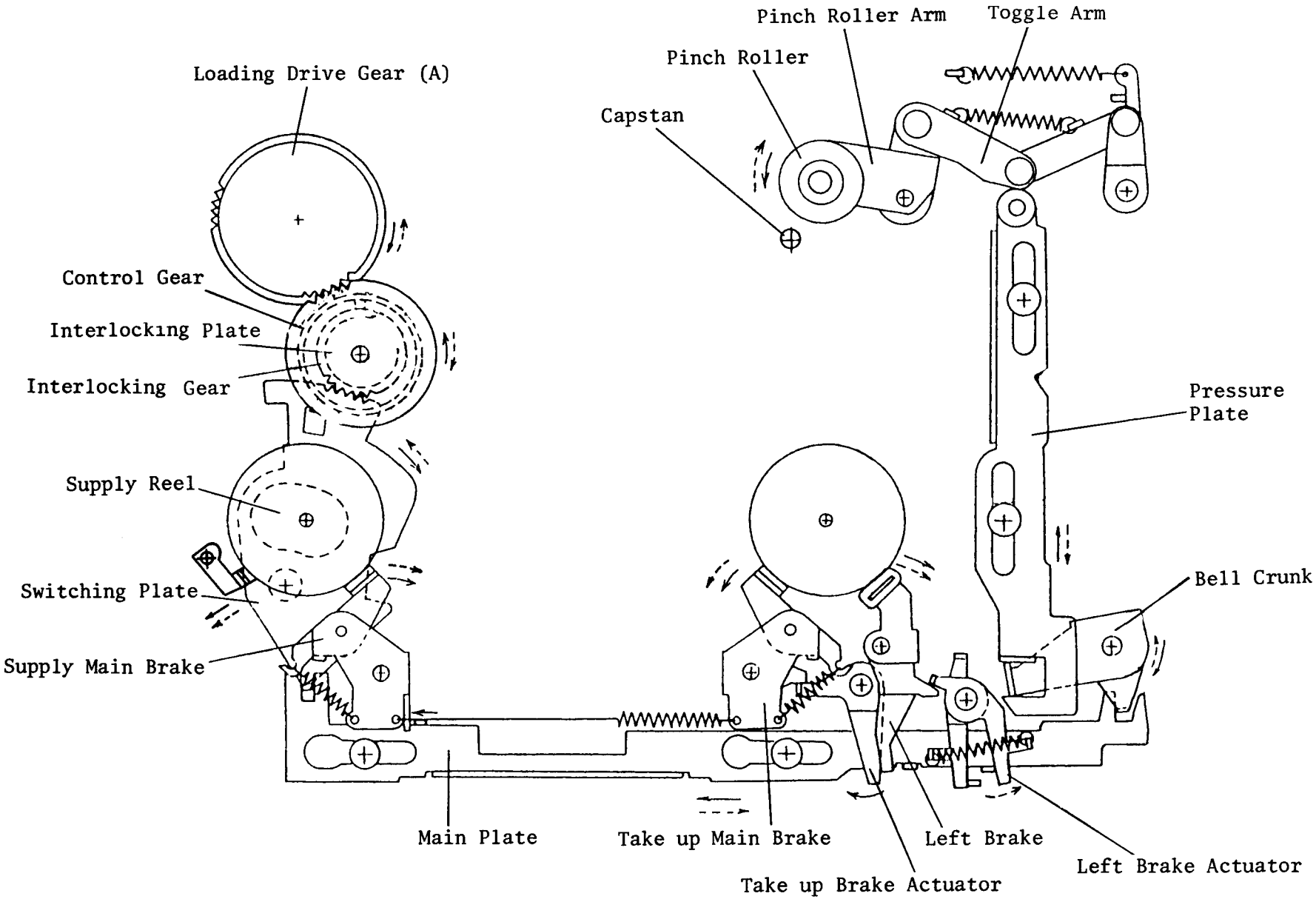


Fig. 5 Reel Brake, Pinch Roller

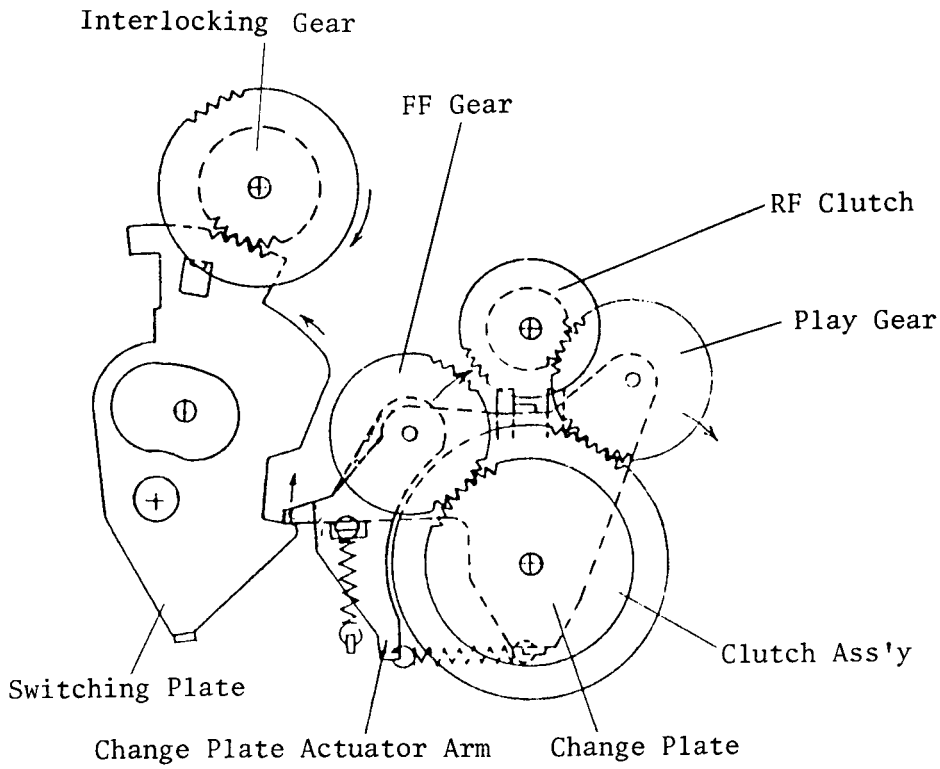


Fig. 6 Reel Revolution Switching Mechanism

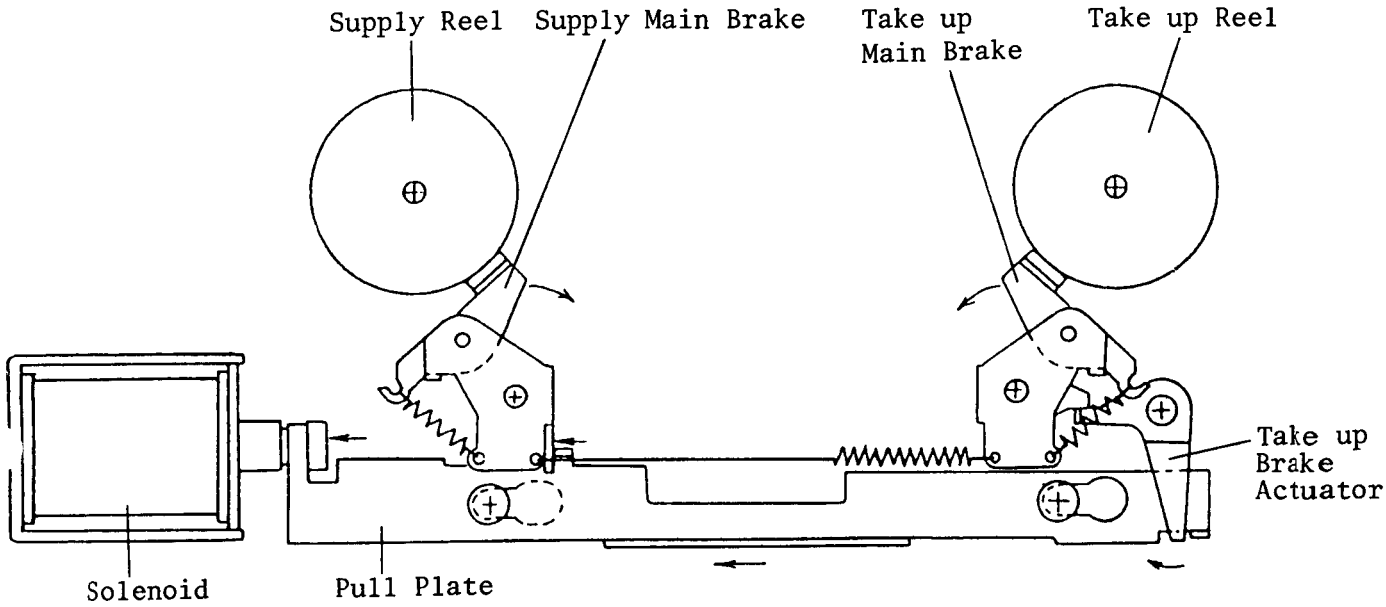


Fig. 7 Solenoid Performance

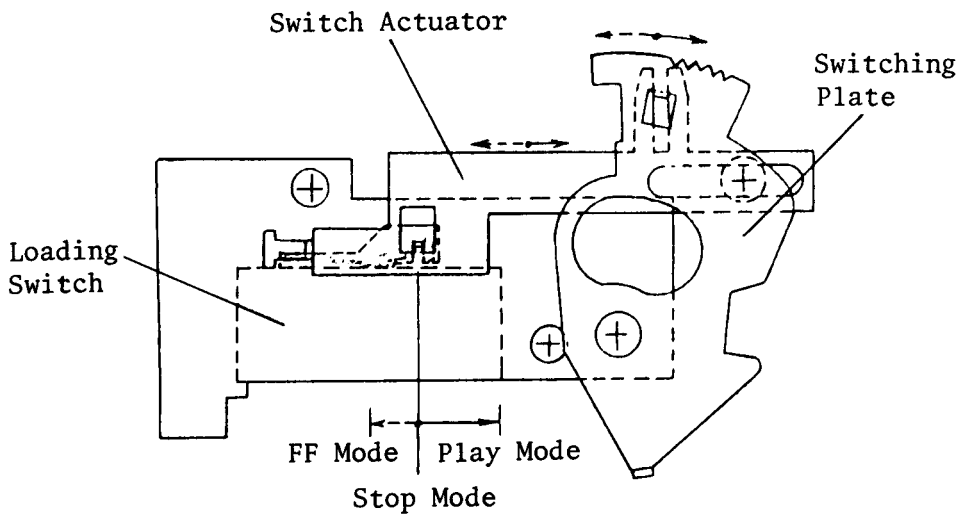


Fig. 8 Loading Switch Performance

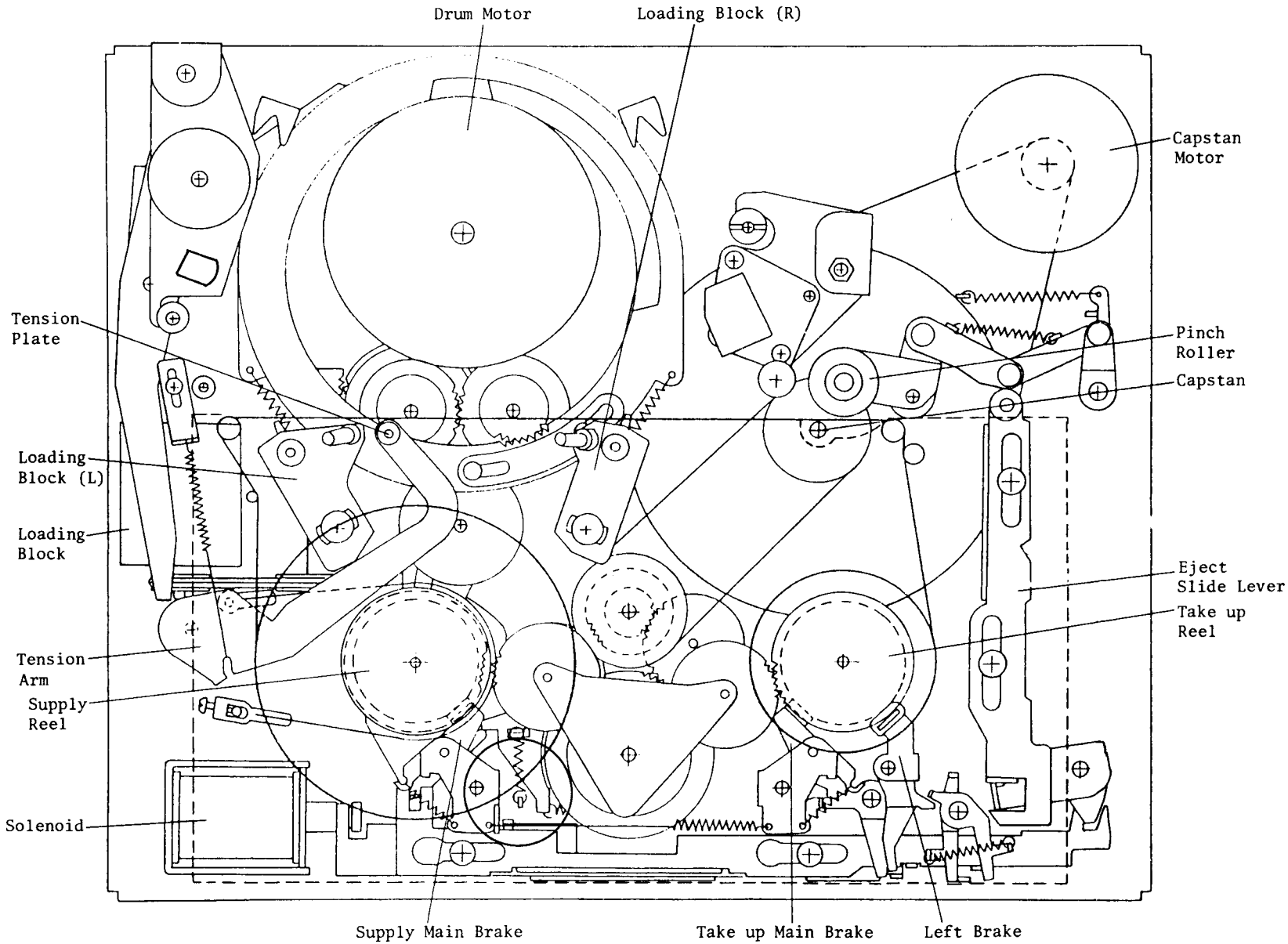


Fig. 9 Stop Mode

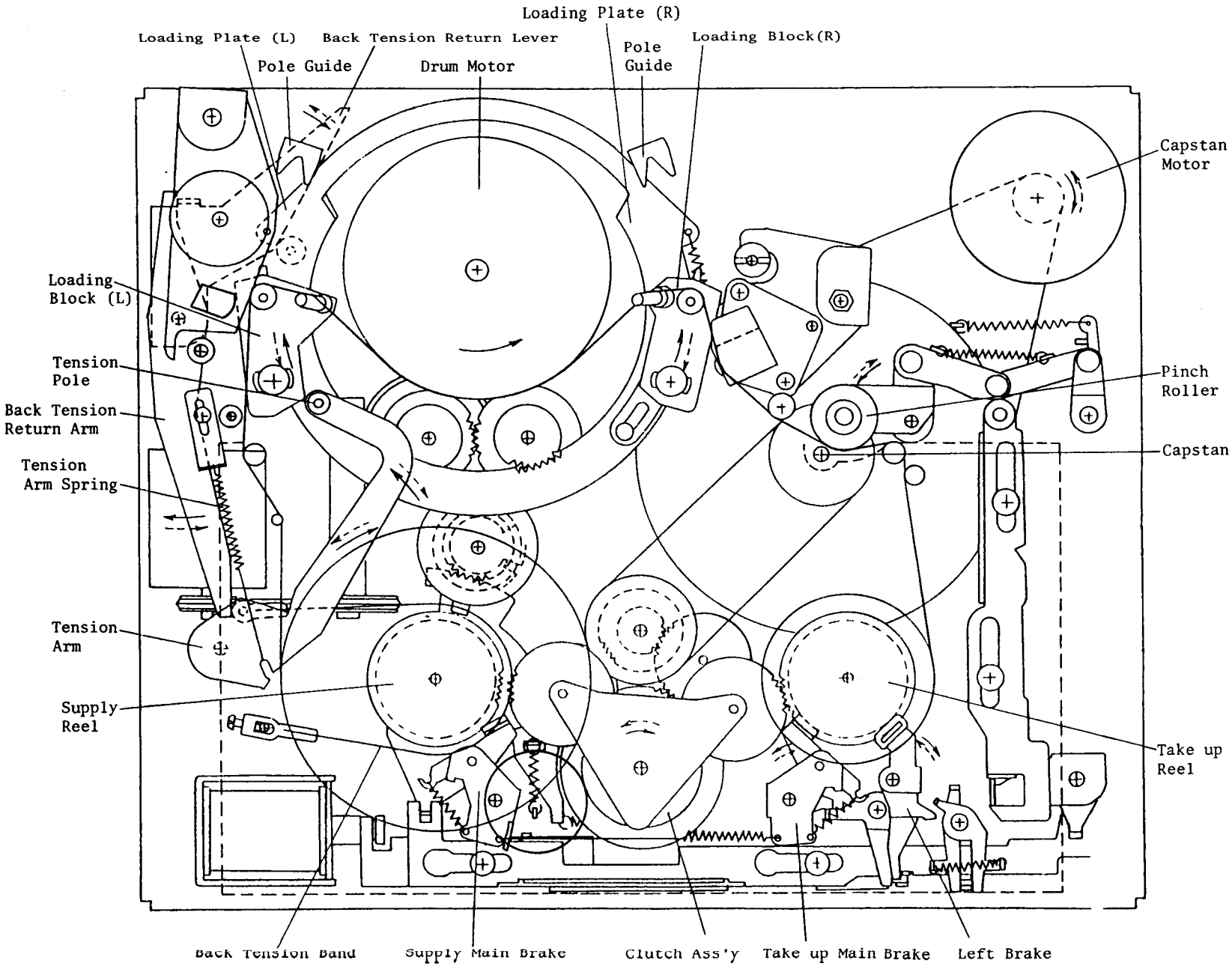


Fig. 10 Loading, Unloading Mode

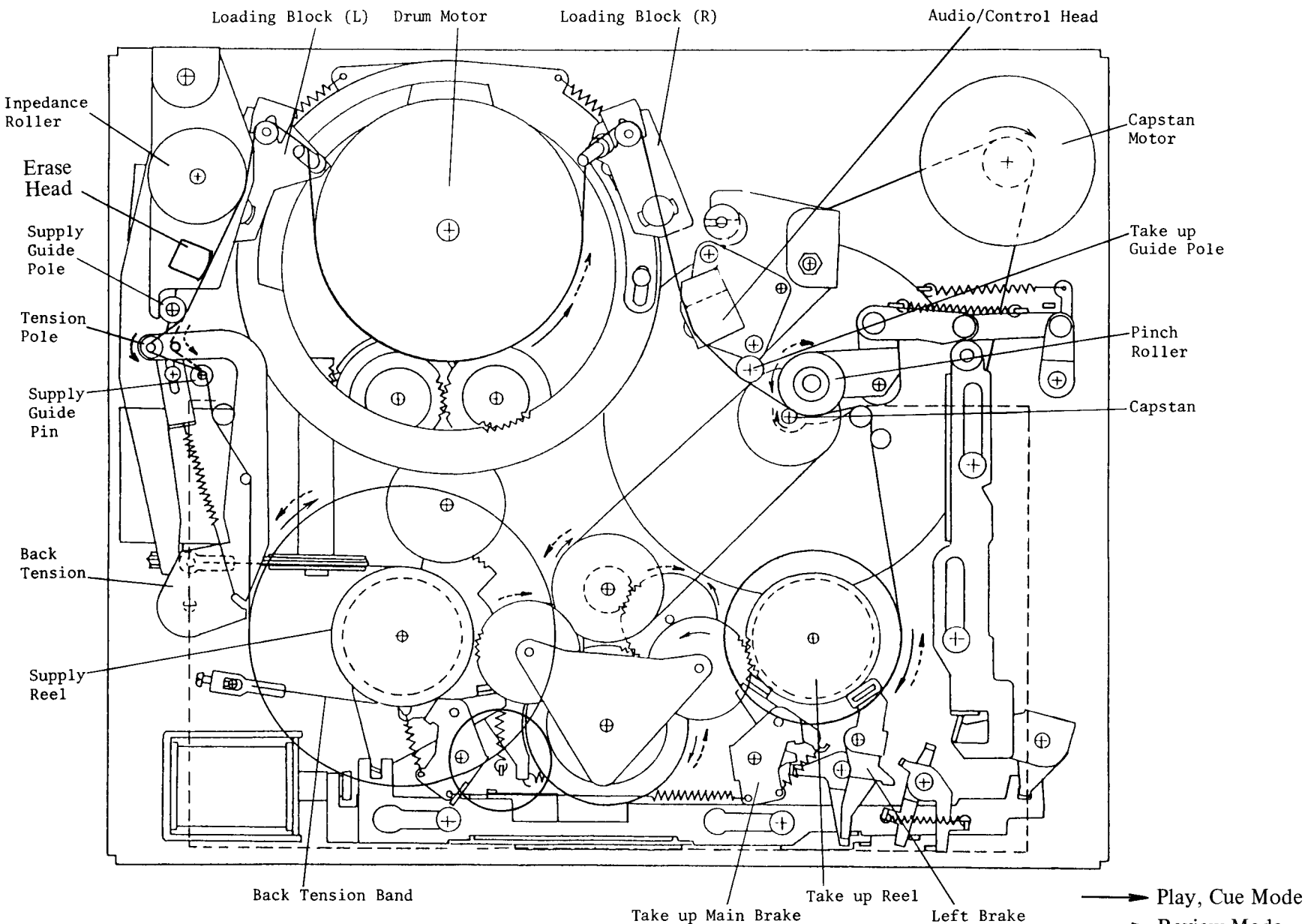


Fig. 11 Play, Cue, Review Mode

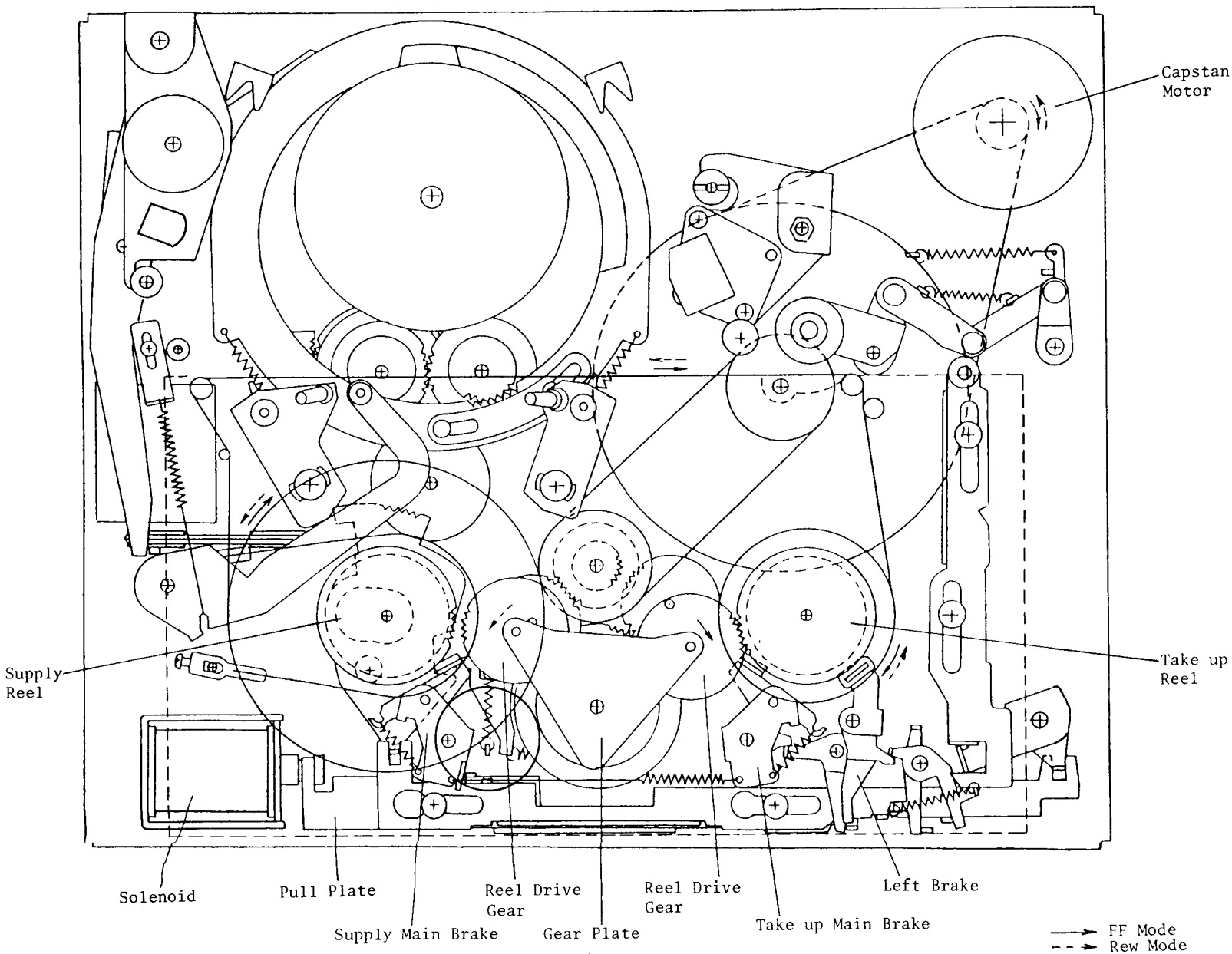


Fig. 12 FF, Rew Mode

Mechanical Adjustment Jig and Tools

Item	Part No.	Adjustment
Dial Gauge	VFK-0190	Reel Height
Master Plane	VFK-0191	Reel Height Tape Guide Height
Height Gauge	VFK-0139B	Tape Guide Height
Torque Meter	VHT-063	Back Tension
Driver Large (Special)		Control Head
Driver Small (Special)		Tape Guide Height
FG Plate Mounting		FG Plate Setting
Wrench M2 Hexagon		Guide Roller Setting
Wrench M2.6 Hexagon		Capstan Pulley Setting
Wrench M3 Hexagon		A/C Head Azimuth
Mirror	VFK-0169	Tape Transportation Check
Box Driver M3		Guide Pole A/C Head Height

1. **Tension arm position (Fig. 13)**
   1. Push play button and loading without video cassette tape.
   2. Turn screw A and match a tip of tension arm to marking on the loading base.

2. **Back tension (Fig. 13)**
   1. Load cassette torque gauge (VHT-063) and push play button.
   2. Loosen screw B and slide backtension plate, until gauge indicates 24 ± 5 g-cm.

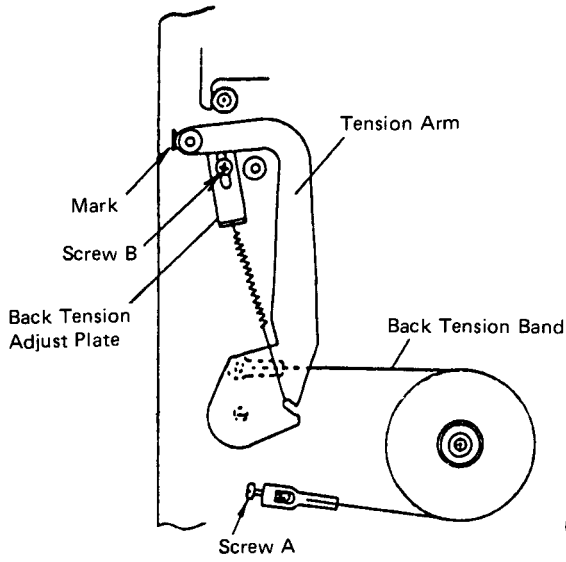


Fig. 13

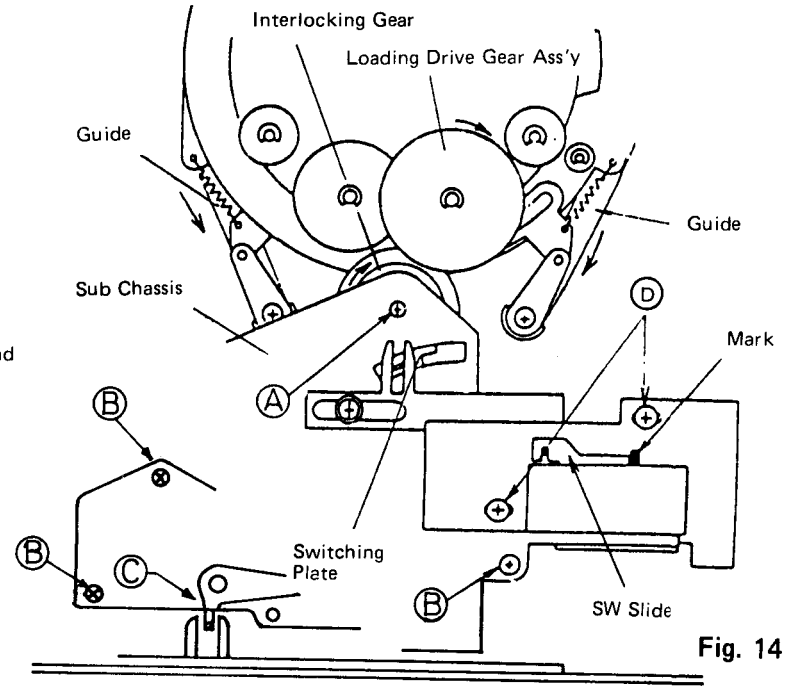


Fig. 14

3. Gearing Position of Interlocking Gear and Switching Plate and Mounting Position of Loading Switch (Fig. 14)

a) Remove the loading motor unit.

b) Lift the sub-chassis while loosening the sub-chassis mounting screws Ⓐ (1 pc.) and Ⓑ (3 pcs.) and release the gearing of interlocking gear and switching plate.

c) Turn the interlocking gear to the direction of arrow till it is stopped.

d) Turn the loading drive gear to the direction of arrow and slide the loading blocks (L) and (R) to the end of guide slot.

e) Lower the sub-chassis to gear the interlocking gear with the switching plate.
Note: Gear them surely not to hold the switching plate. And at the time, c point should gearing as shown Fig. 13

f) Fasten the sub-chassis mounting screws (4 pcs.)

g) At this time, check that the slide section of loading switch is matched with the mark of printed circuit board.

h) If it is not matched, loosen the screws Ⓓ (2 pcs.) and slide the printed circuit board to match it.

i) Fasten the screws.

j) Mount the loading motor unit.

k) When each connector is connected and the power switch is turned on, the STOP mode is obtained. At this time, confirm that the eject lock is not actuated.

l) Check that the loading motor switch is turned off at PLAY, FF and REW modes.

4. FG PLATE MOUNTING (Fig. 15)

1. Put FG plate on boss.
2. Put FG plate mounting jig into capstan bearing.
3. Mount FG plate with jig.
4. Remove jig.
5. Set capstan wheel.
6. Check FG output pulse. (10 ~ 80 mV)

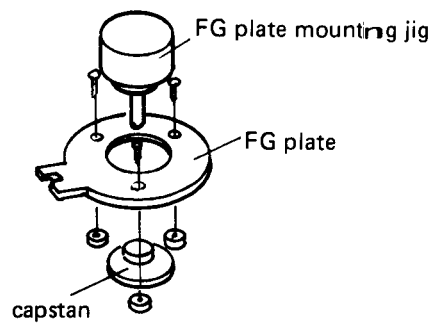


Fig. 60

5. Reel disk height

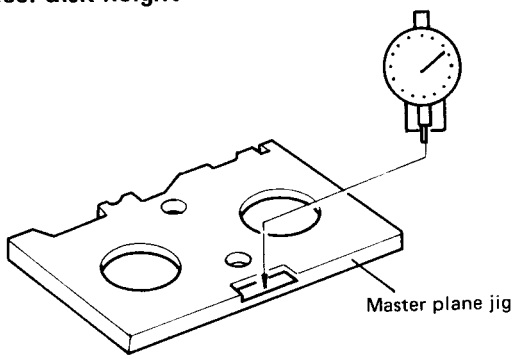


Fig. 16 Master plane jig setting

1. Set the master plane jig as shown in Fig. 16

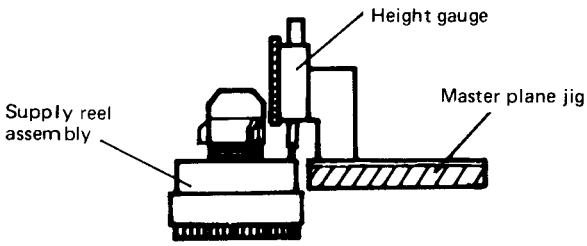


Fig. 17 Reel height adjustment

2. Set dial-gauge on the master plane.
3. Check reel assembly height measure at two places 90° apart. (±0.2 mm) (Fig. 17)

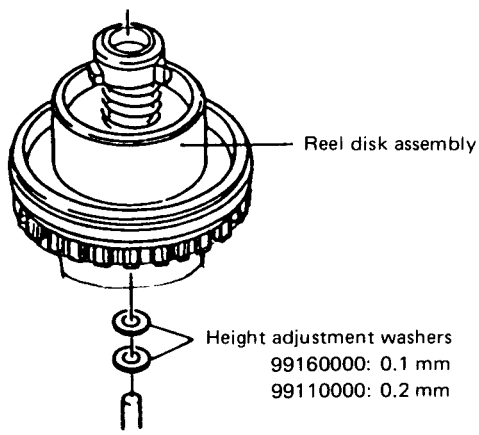


Fig. 18 Washers for height adjustment

4. If it is necessary to adjust the height, add or subtract the required number of height adjustment washers as shown in Fig. 18
5. After reassembling, confirm a small amount of mechanical play between reel disk and slit washer.

6 Guide pole height adjustment

1. Set the master plane jig as shown in Fig. 61

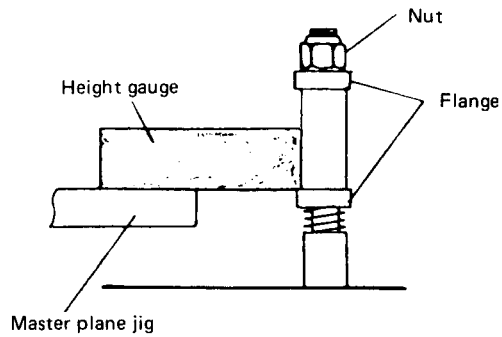
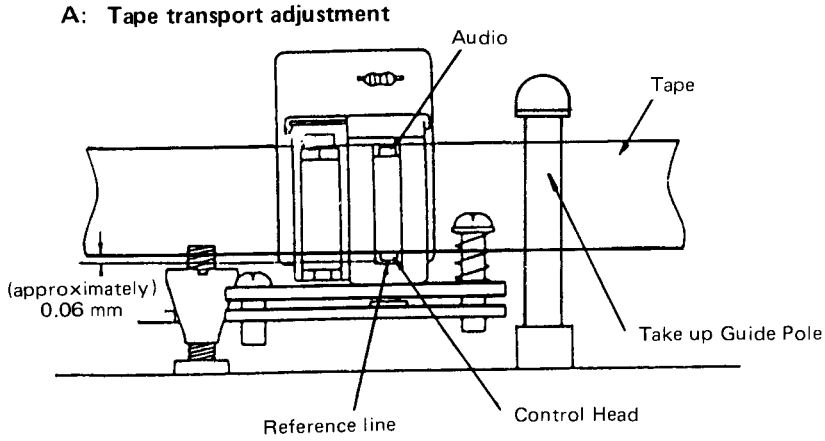


Fig. 19 Guide pole height adjustment

2. Set the height gauge on the master plane jig as shown in Fig. 64
3. For guide pole, check the height of the upper face of the lower flange. If necessary, carefully adjust by turning the nut.
4. If guide pole height has been adjusted following checks and adjustments are required.

7. Audio/control head

A: Tape transport adjustment



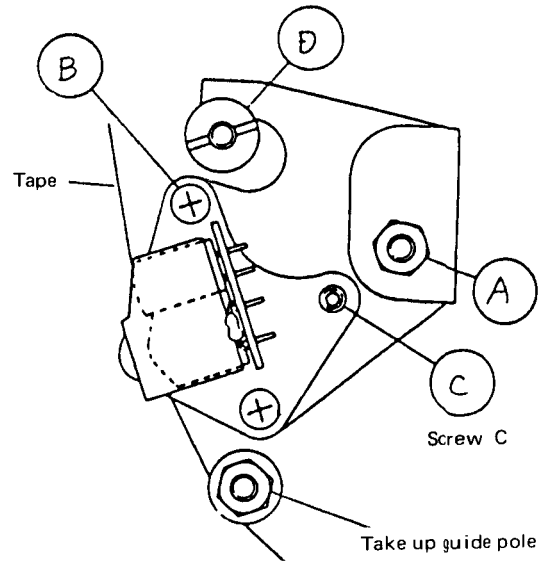


Fig. 20 A/C head adjustment

1. Employ self-recording tape and set for Play mode.
2. Turn screw Ⓒ (Fig. 20) and adjust for smooth transport without tape loosen stretch.

B. Audio/Control head height and azimuth

Connect oscilloscope to Audio Out

1. Play alignment tape (6 kHz and stairstep signals) and measure the audio output level.
2. Turn nut Ⓐ , screw Ⓑ and Ⓒ in succession by small and equal increments at a time and adjust for maximum audio output level. With reference to nut Ⓐ , adjust azimuth with screw Ⓑ and screw Ⓒ so that small tape wrinkles are not produced at the guide pole, but at the same time, audio output becomes maximum and level fluctuations minimum. It is suggested to first turn nut Ⓐ by a small amount, then turn screws Ⓑ and Ⓒ by an equal amount and set for maximum output.
3. Carefully and evenly adjust nut Ⓐ , screw Ⓑ and Ⓒ to align the audio/control head height with the tape as shown in Fig. 20

8. TAPE TRANSPORT SYSTEM CHECKS AND ADJUSTMENT

The tape transport system has been precisely aligned at the factory and normally does not require readjustment. The following steps are therefore necessary only in cases of severe usage or when replacing parts affecting the tape transport system.

A: Tape transport check

1. Employ self-recording tape and operate the machine between Play and Stop modes several times.
2. During Play mode, observe tape at the input and output portions (A and B in Fig. 21) of the head drum lead. Confirm that the tape slips neither upward nor downward with respect to the lead as shown in Fig. 22

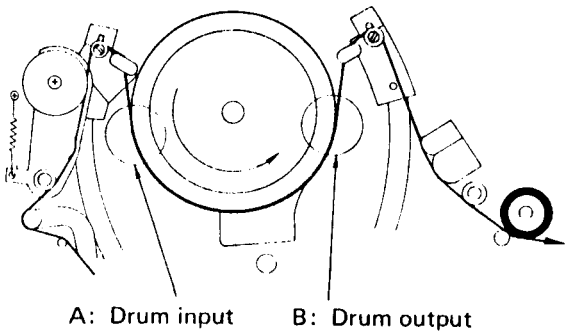


Fig. 21 Tape transport check

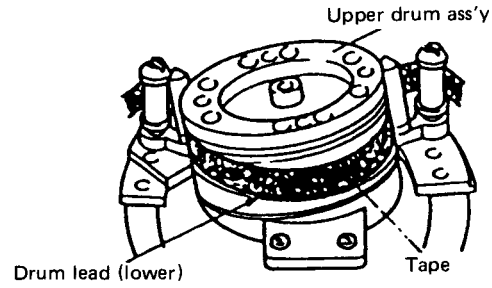


Fig. 22 Drum lead check - 1

NOTES:

1. Slips upward : sound becomes produced by contact between tips of rotating heads and edge of tape.
2. Slips downward : tape curls or wrinkles from contacting lead face (sound may also be produced).
3. During Loading, Play and Unloading, observe the tape at the supply and take up guide rollers and guide poles.
   Confirm absence of curling, wrinkling, etc, as shown in Fig. 23

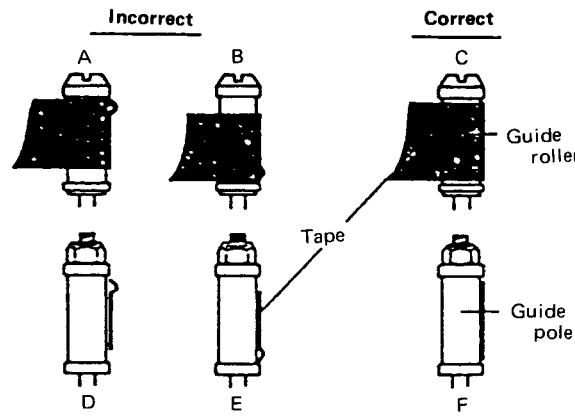


Fig. 23 Guide roller and guide pole

4. Observe the tape as it becomes wrapped around drum during loading and as it separates from the drum during unloading.
   Confirm absence of damage to the tape at points C and D as shown in Fig. 24 and absence of contact noise between head tips and tape edge.

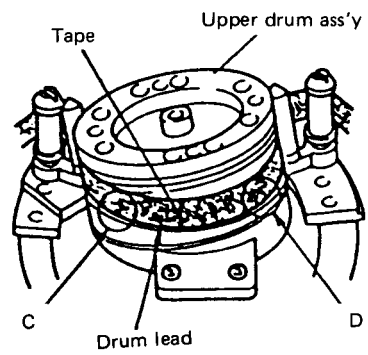


Fig. 24 Drum lead check - 2

5. If defects are noted during the above checks, perform the following adjustments.

B: Guide roller height adjustment

1. Slightly loosen setscrews of the supply and take-up guide rollers as shown in Fig. 25
2. Use self-recording tape and set for Play mode.
3. With a slotted screwdriver, slightly turn the supply guide roller (do not turn more than 180° at a time) and adjust so that at the drum input, the tape travels smoothly in the drum lead without slipping upwards or downwards.
4. Similarly, adjust the take-up guide roller for the drum output.

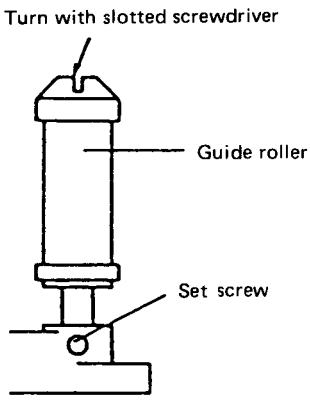


Fig. 25 Guide roller height adjustment

NOTES:

1. Loosen the setscrews only enough to allow the guide rollers to be turned.
   If excessively loose, tape motion may turn the rollers inadvertently.
2. Turn the rollers carefully to avoid damage to the tape.

C: Supply guide pole height adjustment

1. Use self-recording tape and set for Play mode.
2. Use a metric nutdriver to turn the supply guide pole to align the upper flange of the guide pole with the upper edge of the tape as shown by F of Fig. 23 However, this adjustment must be performed so that at the same time, the upper flange remains within ±0.5 mm of the height adjusting jig portion shown in Fig. 19

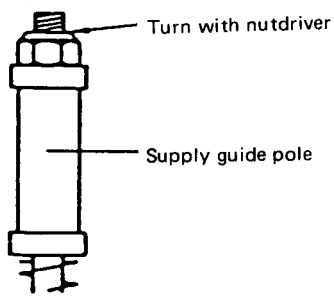


Fig. 26 Supply guide pole height adjustment

If there is a large descrepancy, check the height of the supply reel disk, tension pole and other mechanical components.

9. INTERCHANGEABILITY ADJUSTMENT

Before using alignment tape, employ self-recording tape and confirm correct tape transport.

① Preliminary checks

A: Check sequence 1

1. Connect oscilloscope to TP5.
   At this time, trigger the oscilloscope extrenally with the signal (30Hz square wave) from TP3.
2. Play stairstep portion of the alignment tape.
3. Turn the Tracking control and adjust for maximum FM output at DECK TERMINAL TP5.
   Set the Tracking control to center click position and confirm that nearly maximum output is obtained.

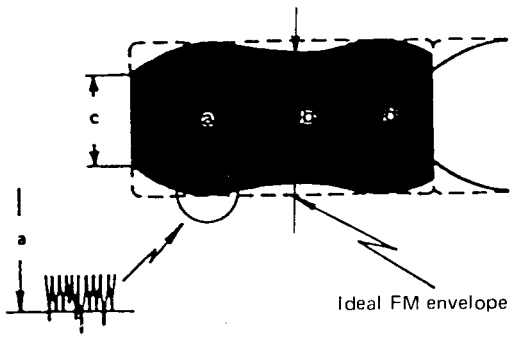


Fig. 28 FM waveform (max. output)

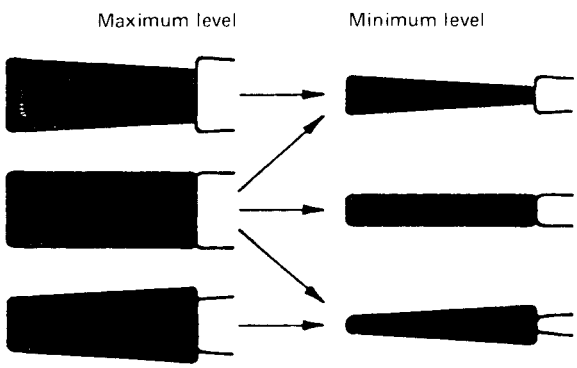


Fig. 29 Normal waveform examples

4. Refer to Fig. 28. Read the level of portion (a) of the waveform. If the waveform is serrated at point (a), read the value at the most uniform serrations as shown at left in Fig. 29.
5. As shown by the broken lines, read the FM waveform value at point (b) and confirm that:

$$\frac{b}{a} \geqq 0.7 \quad \text{or} \quad 20 \log \frac{b}{a} \geqq -3\text{dB}$$

6. Read the values at points (c) and (d) [drum input and output] and confirm that:

$$\frac{c}{a} \geqq 0.5 \text{ and } \frac{d}{a} \geqq 0.5 \ (\geqq -6\text{ dB})$$

NOTES:

1. Read minimum levels for (b), (c) and (d).
2. If above checks yield normal results, proceed to section ① - B.
3. If defects are noted, perform adjustments of section ②.

B: Check sequence 2

1. Observe the FM waveform as in the previous section (① - A) and turn the tracking control.
   The waveform variation should be nearly parallel as shown in Fig. 29
2. If the waveform varies as shown in Fig. 30, adjustment becomes required.

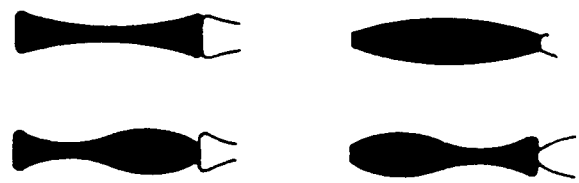


Fig. 30 Incorrect waveform examples

② Preliminary adjustments

1. Loosen the setscrews of the supply guide roller and take-up guide roller.
   If the guide rollers turn freely, slightly tighten the set screws.
2. Connect oscilloscope to TP5.
   Trigger the oscilloscope externally with the signal from TP3.
3. Play the alignment tape (stairstep signal)

A: Drum input

1. Observe oscilloscope display and adjust the Tracking control for maximum FM output.
2. Refer to Fig. 31. Examples of incorrect waveform are shown by A.
   Use a slotted screwdriver to adjust the supply guide roller so that the rising portion (drum input portion) on the waveform becomes flat as shown by B.

NOTES:

1. If the guide roller turns freely, tighten the setscrew slightly.
2. Be sure to adjust the guide roller only by small amounts at a time in order to avoid damaging the alignment tape.

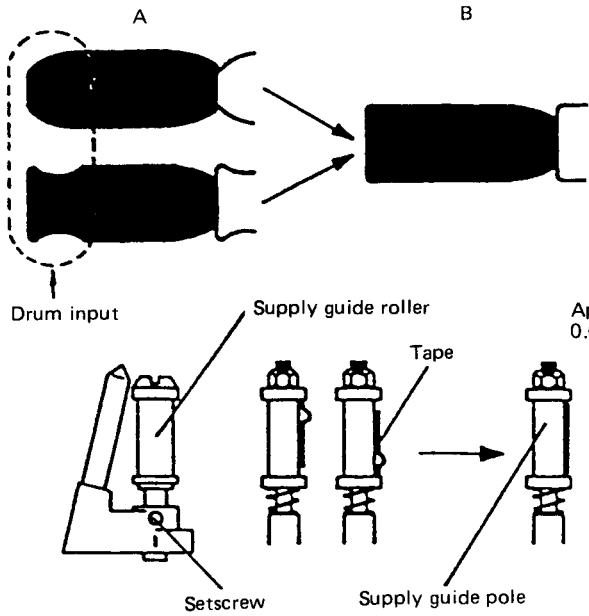


Fig. 31 **Drum input adjustment**

In addition to observing the waveform, confirm absence of tape slippage or curling at the drum lead and guide poles.

3. At the supply guide pole, if the tape separates from the guide or wrinkling occurs, adjust the guide pole height.

B: Drum output

1. In the same manner as for the drum input, turn the take-up guide roller to adjust the falling portion (drum output portion) of the FM waveform.
   Incorrect examples are shown by C in Fig. 32, while D indicates the correct adjustment.
2. If the tape separates from the guide or wrinkling occurs at the take-up guide pole, adjust by turning screw (C) of the audio/control head as shown in Fig. 32.

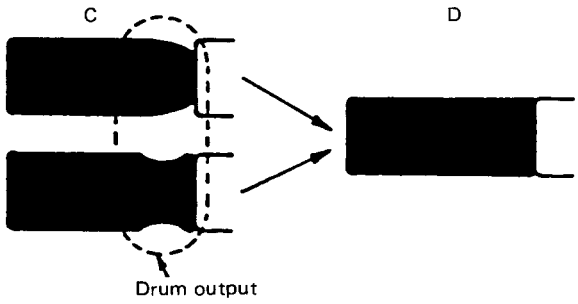


Fig. 32 **Drum output adjustment**

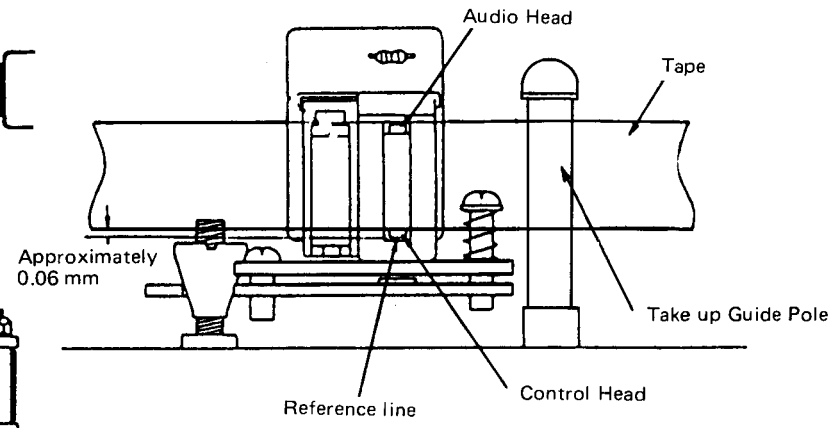


Fig. 33 **Audio/Control head height**

3. Carefully and evenly adjust screws (B), (C) and nut (A) to align the audio/control head height with the tape as shown in Fig. 33.

NOTES:

1. Fine adjustment is not required at this time.
   It is sufficient that the tape is engaged with the guide pole and servo operates stably (control signal picked up).
2. If the tape separates from the take-up guide pole or wrinkling occurs, screw (C) (Fig. 32) has been turned excessively with respect to nut (A) and screw (B) causing the audio/control head to incline forward or rearward. Use care to adjust screws (B), (C) and nut (A) evenly and observe that small wrinkles are not produced at the take-up guide pole.

(3) Interchangeability fine adjustment

1. Connect oscilloscope to TP5.
   Observe the FM waveform and adjust the Tracking control for minimum FM output level.

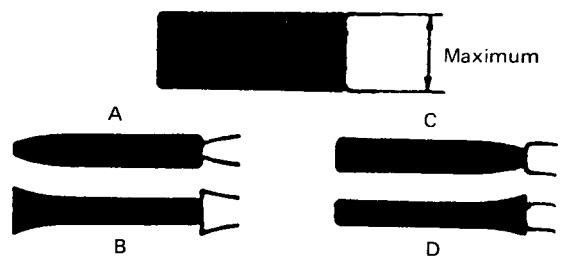


Fig. 34 **Minimum FM output (incorrect examples)**

2. If the waveform becomes as shown by A or B of Fig. 34, carefully adjust the supply guide roller height so that the waveform becomes as shown by E, F or G of Fig. 35.
   At this time, if the waveform fluctuates, adjust to the point of minimum fluctuation.

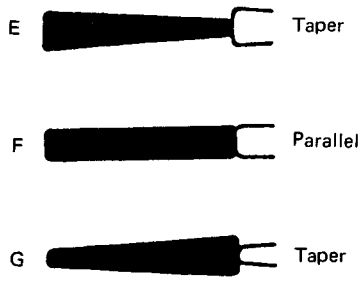


Fig. 35 **Minimum FM output (correct examples)**

Fig. 36 **FM output level**

3. If the FM waveform appears as shown by C or D in Fig. 34, carefully adjust the take-up guide roller height to obtain a waveform such as shown by E, F or G of Fig. 35.
   At this time, if the waveform fluctuates, adjust to the point minimum fluctuation.
4. Vary the Tracking control from maximum to minimum FM output.
   Perform fine adjustment of supply and take-up guide rollers so that waveform variation becomes as shown by E, F or G of Fig. 35.

④ Audio/Control head height, azimuth and inclination

See section 6 Audio/control head height and azimuth.

⑤ Setscrew tightening

1. Check for maximum FM output waveform, maximum audio out and absence of tape wrinkling or other transport irregularities, then secure the guide rollers.
   Perform in Stop mode.
2. Since the guide rollers are easily moved, use care when securing.
3. After tightening the setscrews, again perform interchangeability final check.

⑥ Interchangeability final check

Confirm section 6-1 Preliminary checks.

⑦ Servo circuit adjustment

1. Head switching position (see Electrical Adjustment No. 9).
2. Normal tracking preset (see Electrical Adjustment No. 8).

⑧ Control head phase adjustment

1. Connect oscilloscope to TP5.
   Trigger the oscilloscope externally with the signal from TP3.
2. Play stairstep portion of the alignment tape and observe the oscilloscope display.
3. Set the Tracking control to center click position.
4. Confirm that the level difference between this setting and the maximum level obtained manually is:

$$-20 \log \frac{b}{a} \geqq 1 \text{ dB or } \frac{b}{a} \geqq 0.9 \quad \text{Fig. 36}$$

5. If necessary, adjust as follows.
6. Set the Tracking control to center click position and play the alignment tape (stairstep).
7. Loosen tracking adjustment nut Ⓓ and slide the A/C head assembly fully to the direction of the take-up guide pole.

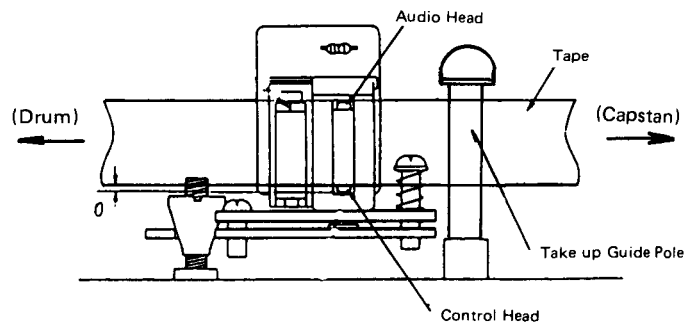


Fig. 37 **Control head phase adjustment**

8. Tighten adjustment nut slide the A/C head assembly slowly in the direction of the arrow as shown in Fig. 37.
9. Set the A/C head assembly to the position where first maximum FM level is obtained. Put screw Locking glue on the nut Ⓓ.

⑨ Final checks (Confirm section 9-1)

PERIODIC MAINTENANCE

The following procedures are recommended for maintaining optimum performance and reliability of this video cassette player.

1 Cleaning

For cleaning, use a lint-free cloth or gauze dampened with alcohol.

A: **Tape transport system**

1. The following components should be cleaned after every 500 hours of use.
   1) Supply guide pin
   2) Tension pole
   3) Supply guide pole
   4) Supply impedance roller
   5) Supply guide roller
   6) Supply slant pole
   7) Video head and Drum system
   8) Drum ground
   9) Drum motor shaft (upper)
   10) Take-up slant pole
   11) Take-up guide roller
   12) Audio/control head and Audio erase head
   13) Take-up guide pole
   14) Pinch roller
   15) Capstan
2. Since above parts come in direct contact with video tape, they tend to collect dust particles. If allowed to accumulate, dust may lead to damage to the video tape and above parts.
3. After cleaning with alcohol, allow the parts to dry thoroughly before using a cassette tape.

NOTE:

When cleaning the two video heads on the upper drum, do not clean them with a vertical stroke. Use only a gentle back and forth motion in the direction of the tape path.
Use care since they are easily damaged.
When cleaning video heads, A/C head and Audio erase head use a lint-free cloth dampened with alcohol.

B: **Reel drive system**

1. The following components should be cleaned after every 1,000 hours of use.

   – Upper section –
   16) Take-up reel
   17) Left brake

   – Bottom section –
   18) Capstan motor pulley
   19) Main belt
   20) Capstan flywheel
   21) Drive belt
   22) RF clutch
   23) Worm pulley
   24) Loading belt
   25) Loading motor
2. The above revolving parts are of rubber or come in direct contact with rubber parts. Rubber dust can accumulate and interfere with proper operation.
3. Avoid using excessive alcohol when cleaning rubber parts.

2 Lubrication

The following components should be lubricated with oil after every 2,000 hours of use.
1) Shaft of the take-up reel
2) Shaft of the supply reel

After cleaning above shafts with alcohol, lubricate these shafts with one or two drops of oil.
Do not over lubricate.

3 Service schedule for main components

The following chart lists the parts which should receive periodic servicing at the recommended intervals.

Name	Periodic Service Schedule(operating hours)					Part Nos.
	1 000	2 000	3 000	4 000	5 000	
Upper drum ass'y	○	●	○	●	○	8000-01-13
RF clutch ass'y		●		●		8000-12-301
Drive belt		●		●		8000-15-07
Clutch ass'y		●		●		8000-12-303
Capstan motor		●		●		8000-16-301
Main belt		●		●		8000-15-06
Loading belt		●		●		8000-05-05
Brake shue (left Brake)		●		●		8000-13-11
Back tension felt ass'y		●		●		8000-08-301
Drum ground		●		●		8000-01-24
Audio/Control head			●			6203-15-03
Full Erase Head			●			6203-15-02
Pinch roller			●			8000-09-01
TAPE Loading motor ass'y			●			6005-03-23
Supply reel ass'y			●			8000-11-301
Take-up reel ass'y			●			8000-11-302
CASSETTE Loading motor ass'y			●			6002-03-12

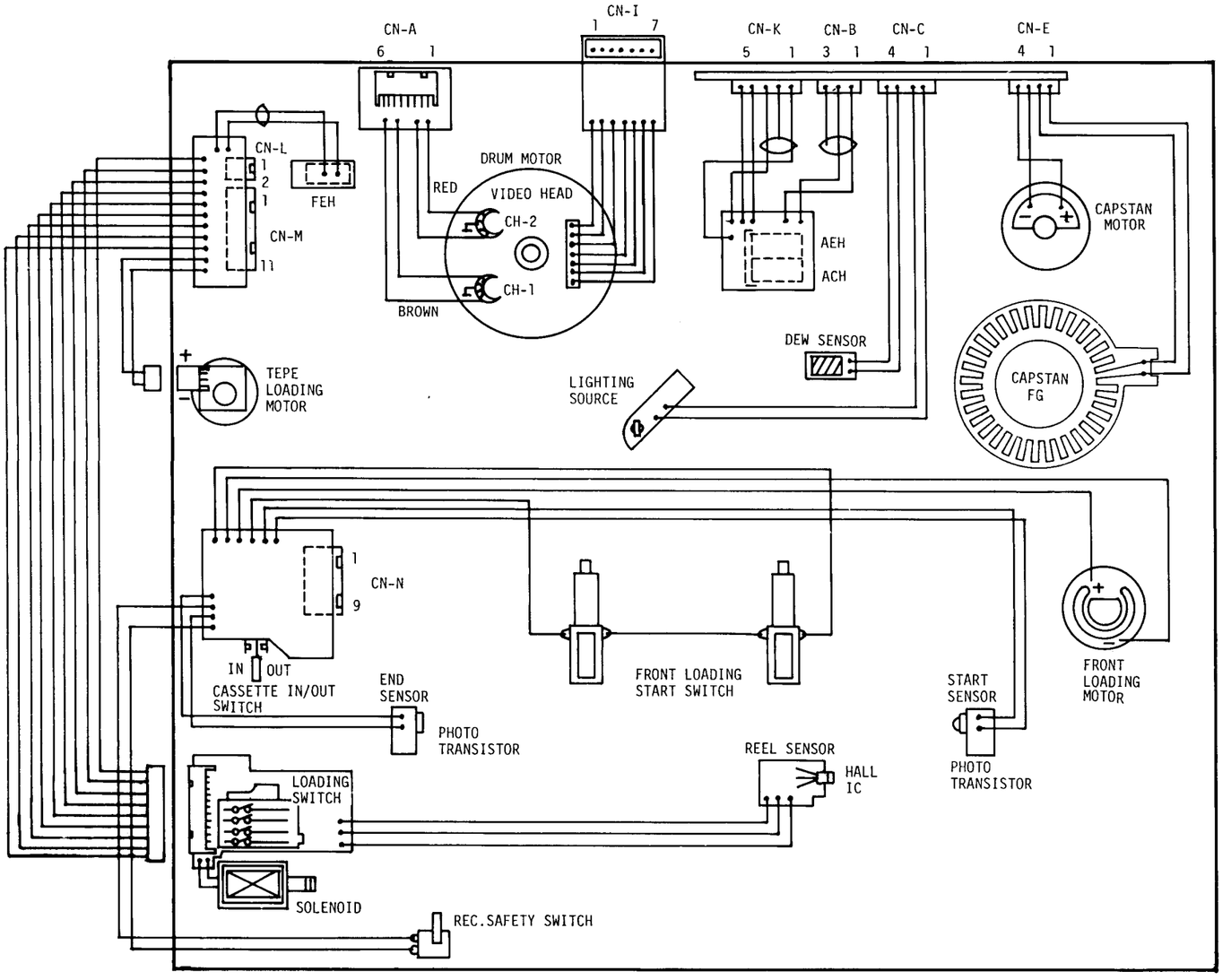
Fig. 38 Standard service periods

○ Check and replace if necessary.
● Replace

4 Note

Even if the unit is not used frequently, Cleaning, Lubrication and Replacement of the belts should be undertaken every 2 years.

WIRING DIAGRAM



CONNECTOR PIN FUNCTION

CN-A

1	+	CHANNEL–2
2	–	
3	GND	VIDEO HEAD
4	GND	
5	–	CHANNEL–1
6	+	

CN-B

1	–	CTL HEAD
2	+	
3	GND	

CN-C

1	A	PHOTO DIODE
2	K	
3	–	DEW SENSOR
4	+	

CN-E

1	FG	CAPSTAN FG
2	GND	
3	–	CAPSTAN MOTOR
4	+	

CN-I

1	+	PG	DRUM MOTOR
2	GND		
3	+	FG	
4	GND		
5	DRIVE		
6	VCC		
7	GND		

CN-K

1	PLAY	AUDIO HEAD
2	GND	
3	REC	
4	GND	AUDIO ERASE HEAD
5	A.E.	

CN-L

1	GND	FULL ERASE HEAD
2	F.E.	

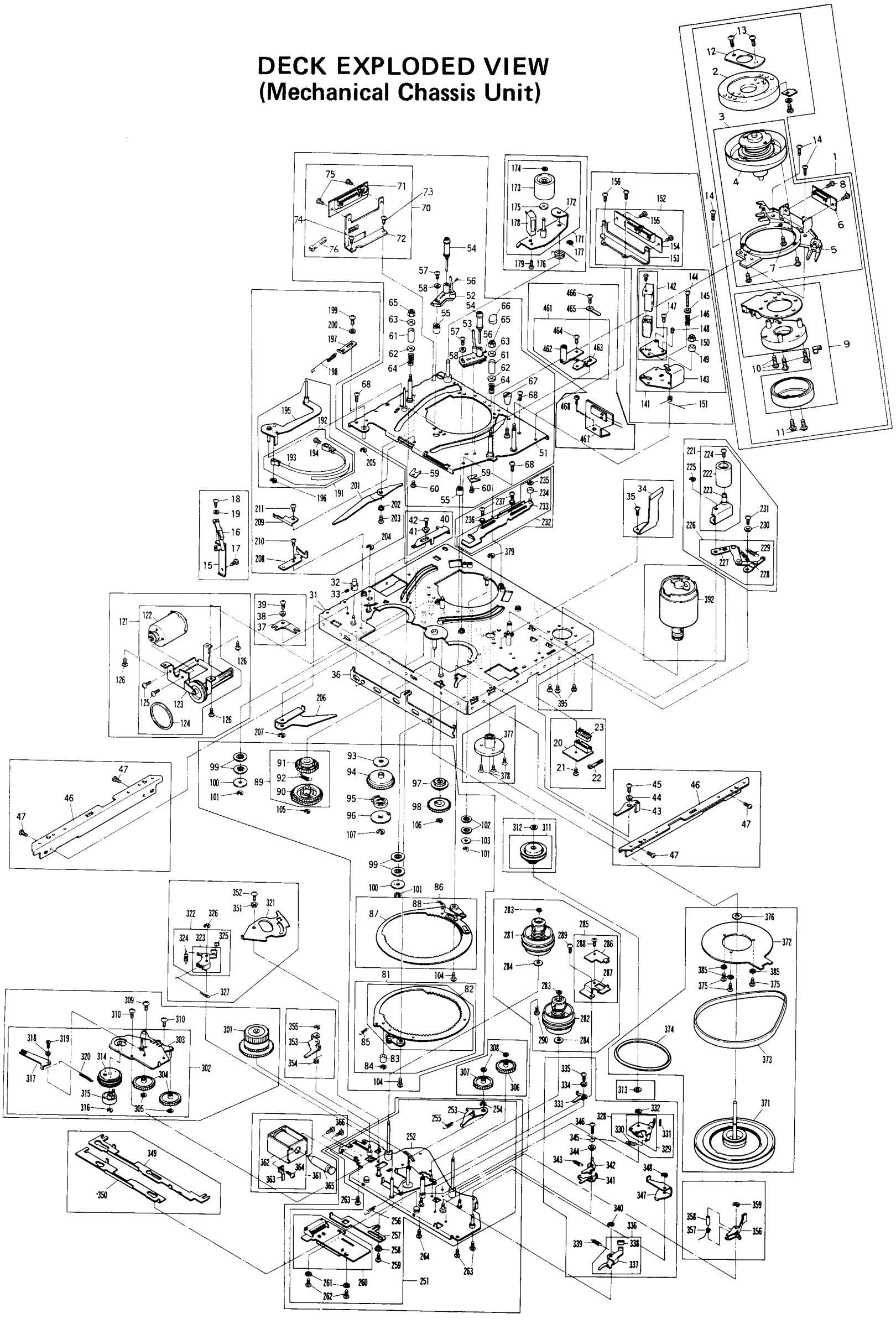
CN-M

1	VCC	REEL SENSOR
2	GND	
3	OUT	
4		SOLENOID
5		
6	C	LOADING SWITCH
7	B	
8	A	
9	COM	
10	+	TAPE LOADING MOTOR
11	–	

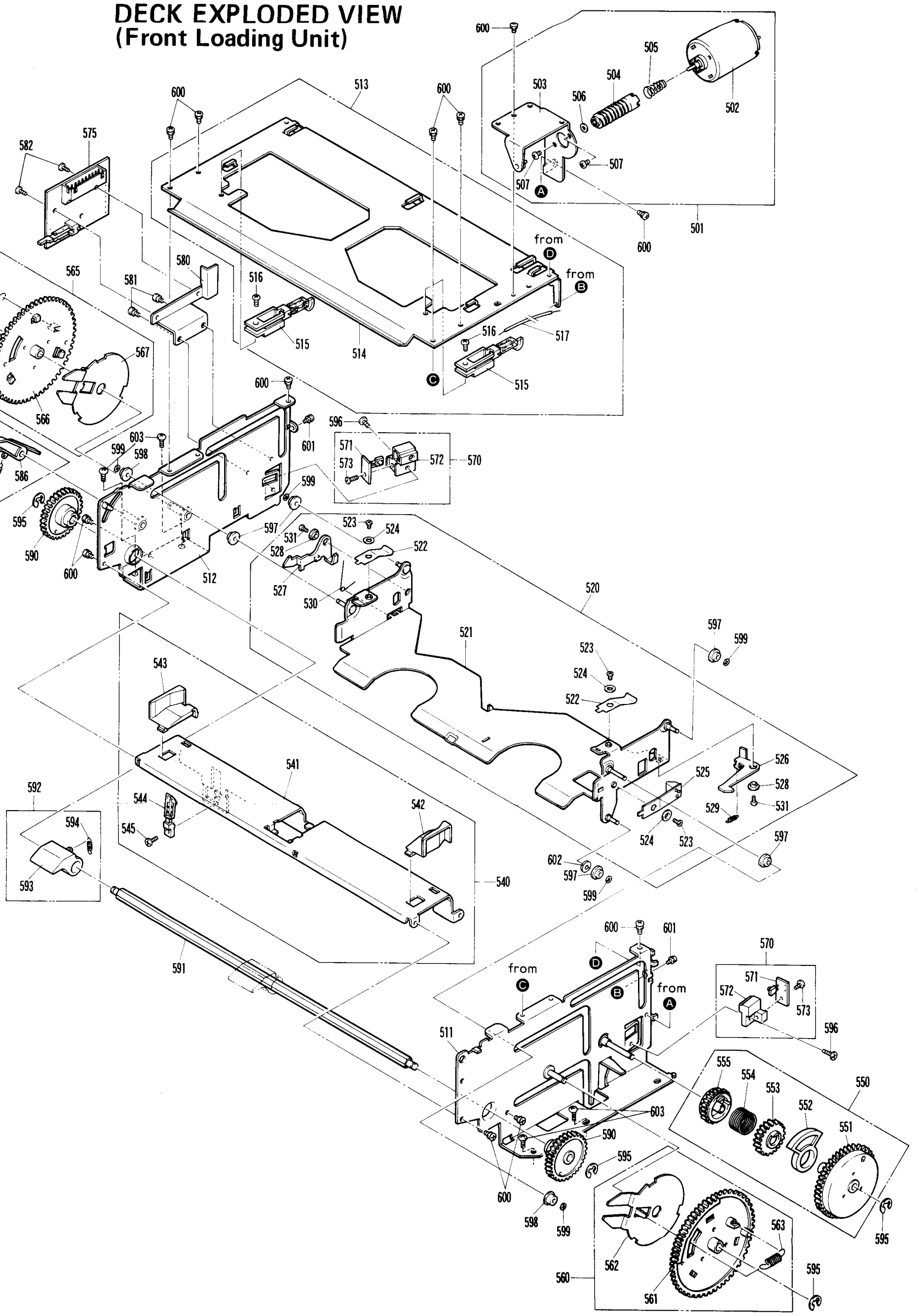
CN-N

1	REC. SAFETY SWITCH	
2	END SENSOR	
3	START SENSOR	
4	COM (GND)	FRONT LOADING SWITCH
5	START	
6	CASSETTE OUT	
7	CASSETTE IN	
8	+	FRONT LOADING MOTOR
9	–	

DECK EXPLODED VIEW
(Mechanical Chassis Unit)



DECK EXPLODED VIEW
(Front Loading Unit)



Mechanical Parts List (DECK)

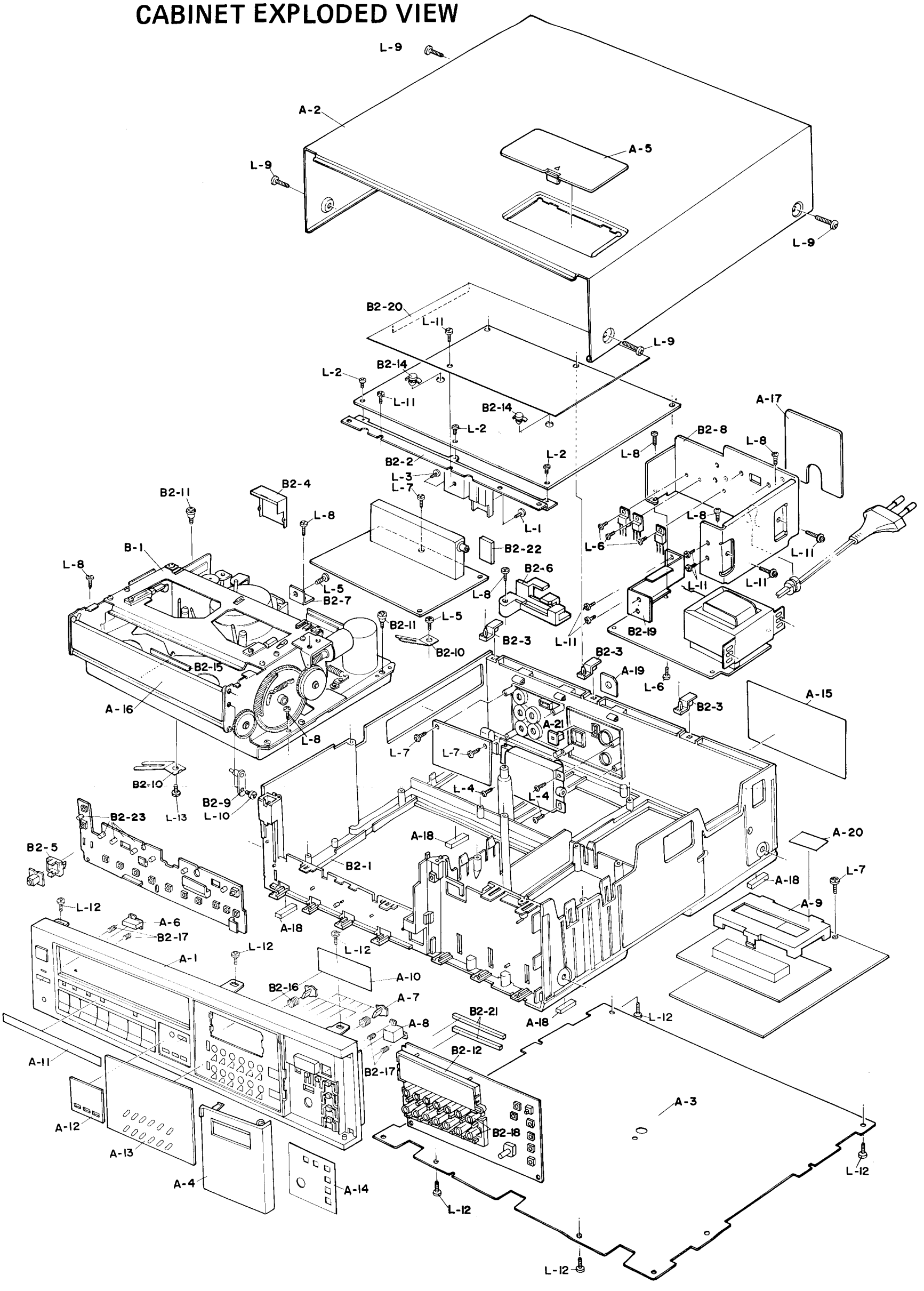
Ref. No.	Description	Parts No.	Ref. No.	Description	Parts No.
1	Cylinder Ass'y	8000-01-301	73	Screw, Sems M2.6x4	9096-00-00
2	Drum, Upper with Video Head	8000-01-13	74	Screw, Camera M2.6x2.5	9555-00-00
4	Drum, Lower Ass'y	8000-01-303	75	Screw, Small M2x4	9116-00-00
5	Mount, Cylinder	8000-01-22	76	Clamp, Wire	1203-01-05
6	PCB Ass'y, Video Out	8000-01-304	82	Rivet, Loading Plate (L)	8000-04-501
7	Screw, Sems M3x10	9109-00-00	83	Roller, Back Tension Return	8000-04-25
8	Screw, Small M2.6x5	9039-00-00	84	E-Ring ϕ1.5	9500-00-00
9	Motor, E20EL05 with Motor, Styrol PCB	6003-09-03	85	Spring, Loading Plate	8000-04-23
			87	Rivet, Loading Plate (R)	8000-04-502
10	Screw, Camera M2x12	9824-00-00	88	Spring, Loading Plate	8000-04-23
11	Screw, Sems M2.6x6	9098-00-00	90	Gear (A), L Drive	8000-04-13
12	PCB for Upper Drum	8000-01-14	91	Gear (B), Ass'y, L Drive	8000-04-304
13	Screw, Sems M3x8	9064-00-00	92	Gear Spring, L Drive	8000-04-16
14	Screw, Sems M3x8	9108-00-00	93	Washer, Flat ϕ4 x ϕ16 x t0.6	9956-00-00
15	Bracket, Drum Ground	8000-01-23	94	Gear, Control	8000-04-20
16	Ground, Drum	8000-01-24	95	Plate, Gang	8000-04-21
17	Screw, C-Tite M3x5	9202-00-00	96	Gear, Gang	8000-04-22
18	Screw, Small M3x4	9061-00-00	97	Gear, Joint B	8000-04-19
19	Washer, Flat ϕ3 x ϕ8 x t0.5	9337-00-00	98	Gear, Joint A	8000-04-18
	PCB Ass'y Drum Motor	8000-01-306	99	Gear, Guide	8000-04-09
21	Screw, Small 2.6x5	9137-00-00	100	Washer, Flat ϕ2.5 x ϕ1.4 x t1	9955-00-00
22	Clamp Wire	1203-01-05	101	E-Ring ϕ2.0	9502-00-00
23	Connector Ass'y, Drum Motor	8000-01-21	102	Roller, Guide	8000-04-10
31	Rivet, Chassis	8000-02-501	103	Washer, Flat ϕ2.5 x ϕ10 x t1	9954-00-00
32	Adjuster, Cassette	8000-02-15	104	Screw, Small M2.6x4	9038-00-00
33	Screw, Set with Hexagon Hole 2.6x4	9951-00-00	105	E-Ring ϕ3.2	9506-00-00
34	Angle, Open	8000-02-14	106	E-Ring ϕ2.3	9503-00-00
35	Screw, C-Tite M2.6x5	9192-00-00	107	E-Ring ϕ2.5	9504-00-00
36	Rivet, Back Tension Change Plate	8000-02-502	122	Motor Ass'y, Loading	8000-05-305
37	Arm (B), Back Tension Change	8000-13-32	123	Holder Ass'y, Motor	8000-05-303
38	Collar	8000-08-12	124	Belt, Loading	8000-05-05
39	Screw, Camera S-Tite M2.6x3.5	9840-00-00	125	Screw, Small M3x3	9962-00-00
40	Actuator (B), Back Tension	8000-13-31	142	Head, Audio CFL H2918	6203-15-01
41	Collar	8000-08-12	143	Rivet Head Base	800-06-501
42	Screw, C-Tite M2.6x5	9192-00-00	144	Screw, Small M2.6x12	9045-00-00
43	Return Arm, Right Brake	8000-02-21	145	Washer, Flat ϕ2.6 x ϕ4;6 x t0.4	9311-00-00
46	Bracket, Mecha	8000-19-05	146	Spring, Azimuth	8000-06-04
47	Screw, C-Tite M3x5	9202-00-00	147	Screw, Small M2.6x7	9041-00-00
51	Rivet, Loading Base	8000-03-501	148	Screw, Set with Hexagon Socket 3x5	9950-00-00
52	Block (L), Loading	8000-03-08	149	Collar, Adjust	8000-06-05
53	Block (R), Loading	8000-03-09	150	Nut, Nylon M3	9953-00-00
54	Post, Roller	8000-03-11	151	Spring, Head	8000-06-03
55	Boss, Loading	8000-03-12	153	Bracket, Control Head P.C.B.	8000-06-12
56	Screw, Set with Hexagon Hole 2x3	9952-00-00	154	PCB Ass'y, Control Head	8000-06-305
57	Screw, Camera M2.6x4.5	9559-00-00	155	Screw, Small M2x4	9116-00-00
58	Washer, Flat ϕ2.6 x ϕ7 x t0.8	9324-00-00	156	Screw, Sems M2.6x5	9097-00-00
59	Holder, Loading	8000-03-13	172	Rivet, Impedance Roller Plate	8000-07-501
60	Screw, Sems M2x6	9079-00-00	173	Roller, Impedance	8000-07-05
61	Guide, Tape	8000-03-14	174	Washer, Polysider ϕ1.6 x ϕ3.8 x t0.3	9734-00-00
62	Flange, Tape Guide	8000-03-18	175	Washer, Polyslider ϕ2.1 x ϕ5 x t0.3	9447-00-00
63	Flane (B), Tape	8000-03-20	176	FE Plat Spring	8000-07-04
64	Spring, Tape Guide	8000-03-15	177	E-Ring ϕ3.0	9505-00-00
65	Nut, M3	9453-00-00	178	Full Erase Head	6203-15-02
66	Cap, Guide	8000-03-19	179	Screw, Small M2x4	9002-00-00
67	Nut, Tracking Adjuster	8000-03-16	193	Flet Ass'y, Back Tension	8000-08-301
68	Screw, Sems M3x6	9107-00-00	194	Screw, C-Tite M2x6	9182-00-00
69	Guide (B), Tape	8000-03-26	195	Arm Ass'y, Tension Arm	8000-08-501
70	Bracket Ass'y, Mode Switch P.C.B.	8000-03-302	196	E-Ring ϕ1.5	9500-00-00
71	P.C.B. Ass'y, Mode Switch	8000-03-303	197	Plate, Back Tension Adjusting	8000-08-13
72	Bracket, Mode Switch	8000-03-21	198	Spring, Tension Arm	8000-08-14

Ref. No.	Description	Parts No.
201	Arm, Back Tension Return	8000-08-10
206	Lever, Back Tension Return	8000-08-11
208	Guide, Tension	8000-08-17
209	Saport (B), Back Tension	8000-08-16
222	Roller, Pinch	8000-09-01
223	Rivet, Pinch Roller Arm	8000-09-504
227	Rivet, Toggle Arm	8000-09-505
228	Spring (B), Pinch Roller	8000-09-05
229	Spring (A), Pinch Roller	8000-09-04
233	Rivet, Pressure Plate	8000-09-503
234	Roller, Pressure	8000-09-08
252	Rivet, Sub Chassis	8000-10-502
253	Arm, Change Plate Plate Action	8000-10-17
255	Spring, Change Plate	8000-10-15
256	Spring, Change Plate Action Arm	8000-10-19
257	Actuator, Switch	8000-10-16
260	Connector Ass'y, Mode Switch	8000-10-302
261	Washer, Flat ϕ2.6 x ϕ5 x t0.5	9308-00-00
281	Reel Ass'y, Supply	8000-11-301
282	Reel Ass'y, Take-up	8000-11-302
283	Washer, Polyslider ϕ2.1 x ϕ5 x t0.5	9876-00-00
284	Washer, ϕ3.1 x ϕ6 x t0.5	9912-00-00
286	PCB Ass'y, Reel Sensor	8000-11-304
287	Bracket, Reel Sensor	8000-11-08
288	Screw, Camera M2.6x3	9556-00-00
301	Ass'y, Clutch	8000-12-304
303	Rivet, Gear Holder	8000-12-503
304	Gear, R Drive	8000-12-19
306	Gear Shaft A	8000-12-07
307	Gear, FF	8000-12-08
309	Screw, Camera M2x5	9552-00-00
310	Screw, Small M2x5	9003-00-00
311	Clutch Ass'y, RF	8000-12-301
312	Washer, Nylon ϕ3.1 x ϕ6 x t0.3	9853-00-00
313	Washer, Polyslider ϕ2.6 x ϕ6 x t0.5	9884-00-00
314	Gear (B) Ass'y, Return	8000-12-306
315	Drum Ass'y, Return	8000-12-307
317	Arm, Return	8000-12-18
318	Arm Collar, Return	8000-12-26
319	Screw, Camera M2x3	9562-00-00
320	Spring, Return	8000-12-25
321	Plate, Switching	8000-13-30
323	Main Brake Ass'y, Supply Reel	8000-13-501
324	Spring, Brake Arm	8000-13-09
325	Shue B, Brake	8000-13-26
327	Spring, Brake Main	8000-13-10
329	Main Brake Ass'y, Take-up Reel	8000-13-502
333	Arm, Take-up Brake Actuator	8000-13-34
337	Arm, Left Brake	8000-13-33
338	Shue, Brake	8000-13-11
339	Spring, LB Arm	8000-13-18
341	Arm, Right Brake Actuator	8000-13-21
342	Arm, Left Brake Actuator	8000-13-20
343	Spring, Nutral	8000-13-25
344	Collar, Left Brake Actuator Arm	8000-13-29
345	Spring, Left Brake Actuator Arm	8000-13-28
346	Screw, Small M2.6x9	9140-00-00
347	Crank, Bell	8000-13-23
349	Plate Main	8000-13-02
350	Plate, Pull	8000-13-03

Ref. No.	Description	Parts No.
353	Brake Ass'y, S Soft	8000-13-305
354	Spring, S Soft Brake	8000-13-16
356	Arm Ass'y, Back Tension	8000-13-306
357	Spring, Right Brake	8000-13-17
358	Sleeve, Right Brake Arm	8000-13-24
362	Planger Ass'y, Main	8000-14-07
363	Board, Release Spring	8000-14-06
364	Screw, Sems M2x4	9077-00-00
365	Planger	8000-14-04
366	Screw, Small M2.6x4	9038-00-00
371	Capstan Ass'y, Flywheel (N)	8000-15-301
372	PCB, FG Plate N	8000-15-18
373	Belt, Main	8000-15-06
374	Belt, Drive	8000-15-07
376	Washer, Nylon ϕ3.6 x ϕ10 x t0.5	9957-00-00
377	Capstan Metal	8000-15-04
378	Screw, Flat M2.6x6	9684-00-00
392	Motor Ass'y, Capstan	6003-09-04
395	Screw, Pan Small M3x3	9060-00-00
462	PCB Ass'y, Lamp	8000-18-302
463	Bracket, Lamp	8000-18-01
464	Screw, Small	9136-00-00
465	Clamp, Cord (A)	8000-18-10
467	Sensor,	6808-08-01
468	Screw, Sems M3x4	9105-00-00
502	Motor Ass'y, Loading	8000-19-303
503	Rive, Motor Bracket	8000-19-501
504	Gear, Worm	8000-05-03
505	Spring,	8000-19-55
506	Washer, ϕ2.1 x ϕ5 x t0.4	9732-00-00
507	Screw, Small M2.6x3	9036-00-00
511	Rivet, Housing Bracket (R)	8000-19-502
512	Rivet, Housing Bracket (L)	8000-19-503
513	Plate Ass'y, Top	8000-19-304
	Consists of follwing	
514	Top Plate	8000-19-03
515	Switch, Leaf MSW-1429C	6401-01-108
516	Screw, Bind Small M2.6x4	9136-00-00
517	Wire, Lead	8000-19-52
520	Holder Ass'y, Cassette	8000-19-305
521	Rive, Cassette Holder	8000-19-504
522	Pressure, Cassette	8000-19-11
523	Screw, Camera M2.3x2	9833-00-00
524	Washer, Flat ϕ3 x ϕ6 x t1	9342-00-00
525	Plate Ass'y, Lock Release	8000-19-306
526	Lock Plate (R), C	8000-19-60
527	Lock Plate (L), C	8000-19-62
528	Coller, Lock Plate, C	8000-19-63
529	Spring (R), Lock Plate C	8000-19-64
530	Spring (L), Lock Plate C	8000-19-65
531	Screw, Camera M2x2.3	9549-00-00
540	Bracket Ass'y, Front	8000-19-307
541	Bracket, Front	8000-19-04
542	Guide (R), Tape	8000-19-25
543	Guide (L), Tape	8000-19-26
544	Switch, Leaf MSW-1432NBKU	6401-01-88
545	Screw, Bind Small	9136-00-00
551	Worm Wheel	8000-19-14
552	Stopper	8000-19-17

Ref. No.	Description	Parts No.	Ref. No.	Description	Parts No.
553	Gear, Drive	8000-19-15			
554	Spring,	8000-19-36			
555	Gear,	8000-19-16			
561	Gear, (R), Lift	8000-19-12			
562	Arm, Lift	8000-19-07			
563	Spring, C Pressure	8000-19-37			
566	Gear (L), Lift	8000-19-13			
571	P.C.B. Ass'y, Senser	8000-19-312			
572	Guide, Senser	8000-19-24			
573	Screw, PME	1821-13-05			
575	P.C.B. Ass'y Housing	8000-19-312			
580	Bracket, Housing P.C.B.	8000-19-09			
581	Screw, Camera M2.6x2.5	9555-00-00			
582	Screw, Bind Small M2x4	9116-00-00			
586	Lever, Lift	8000-19-23			
587	Spring, Door	8000-19-38			
590	Gear, Synchronize	8000-19-18			
591	Shaft, Synchronize	8000-19-28			
592	Stopper Ass'y, Cassette	8000-19-314			
593	Stopper, Cassette	8000-19-27			
594	Spring, C Stopper	8000-19-39			
595	E-Ring ϕ3.0	9505-00-00			
596	Screw, Bind Small M2.6x4	9136-00-00			
597	Roller, Guide (B)	8000-19-20			
598	Roller, Lift	8000-19-21			
599	Washer, ϕ1.6 x ϕ3.8 x t0.3	9743-00-00			
600	Screw, Sems M2.6x4	9096-00-00			
601	Screw, Sems M2x4	9097-00-00			
602	Washer, ϕ2.1 x ϕ5 x t0.4	9732-00-00			
603	Screw, C-Tite M3x5	9202-00-00			

CABINET EXPLODED VIEW



Mechanical Parts List

Ref. No.	Description	Parts No.	Ref. No.	Description	Parts No.
A-1	Front Cabinet Ass'y	6B50019X	B2-7	Deck Holder	6S50208
	Consists of following		B2-8	Heat Sink	6G50021
	Front cabinet	6C50012	B2-9	Door Holder Ass'y	6L50059
	Button, Mode	6D50060	B2-10	Earth Plate	6S50212
	Knob, Eject	6D50063	B2-11	Spesial Screw	6U50123
	Knob, Counter SW.	6D50069			
	Knob, Timer	6D50058	B2-12	Indicator Holder	6N50078
	Lens, LED	6D50065	P2-14	Spacer	PS-3N
	A-6 Knob, Power	6D50068	P2-15	Rubber Cushion B	6P50032
	A-7 Knob, Channel	6D50067	B2-16	Spring A	6V50056
	A-8 Knob, Timer Rec.	6D50064			
	A-10 Panel, Indicator	6E50040			
	A-11 Panel, Mode	6E50042			
	A-12 Panel B, Counter	6E50088	B2-19	Transformer Holder	6H50076
	A-13 Panel B, Channel	6E50066	B2-20	PCB Cover	6P50067
	A-14 Panel, Timer	6E50041	B2-21	Lead Cushion	6P50066
	B2-17 Spring B	6V50057	B2-22	Audio PCB Holder	6P50070
	B2-18 Holder B, LED	6N50085			
A-2	Panel, Top	6G50015	B2-23	LED Bush	6N50091
A-3	Panel Bottom	6R50010			
A-4	Door, Timer	6D50061	L-1	Sems Screw M3 x 8	CPM3308
A-5	Door, Tuner	6D50062	L-2	Sems Screw M3 x 8	FPM3308
A-9	Cover B, Tuner	6D50090	L-3	Sems Screw M3 x 10	FPM3310
A-15	Panel, Type	6H50052	L-4	Tapping Screw M2.6 x 8	DTM3908
A-16	Door	6G50014	L-5	S Tite Screw M3 x 6	GBMS306
A-17	Cover, Heat sink	6P50061			
A-18	Foot	6E50044	L-6	S Tite Screw M3 x 8	GBMS308
A-19	Panel A, Selector	6E50100	L-7	P Tite Screw M3 x 8	GBMP308
A-20	Label, Tuner	6E50107	L-8	P Tite Screw M3 x 12	GBMP312
A-21	Knob, TSG	6D50163	L-9	P Tite Screw M4 x 12	GBMP412
B-1	Deck	TN-8000-P103SRF	L-10	Sems Screw M3 x 5	CPM3305
B2-1	Video Chassis	6C50011	L-11	Cap S Tite Screw M3 x 8	GCMP308
B2-2	Holder, Main PCB	6S50200	L-12	Cap P Tite Screw M3 x 12	GCMP312
B2-3	Holder, PCB	6N50081	L-13	S Tite Screw M3 x 4	GBMS304
B2-4	Shield, Head	6S50211			
B2-5	Base, Jack	6N50079			
B2-6	Holder, Tuner	6D50123			

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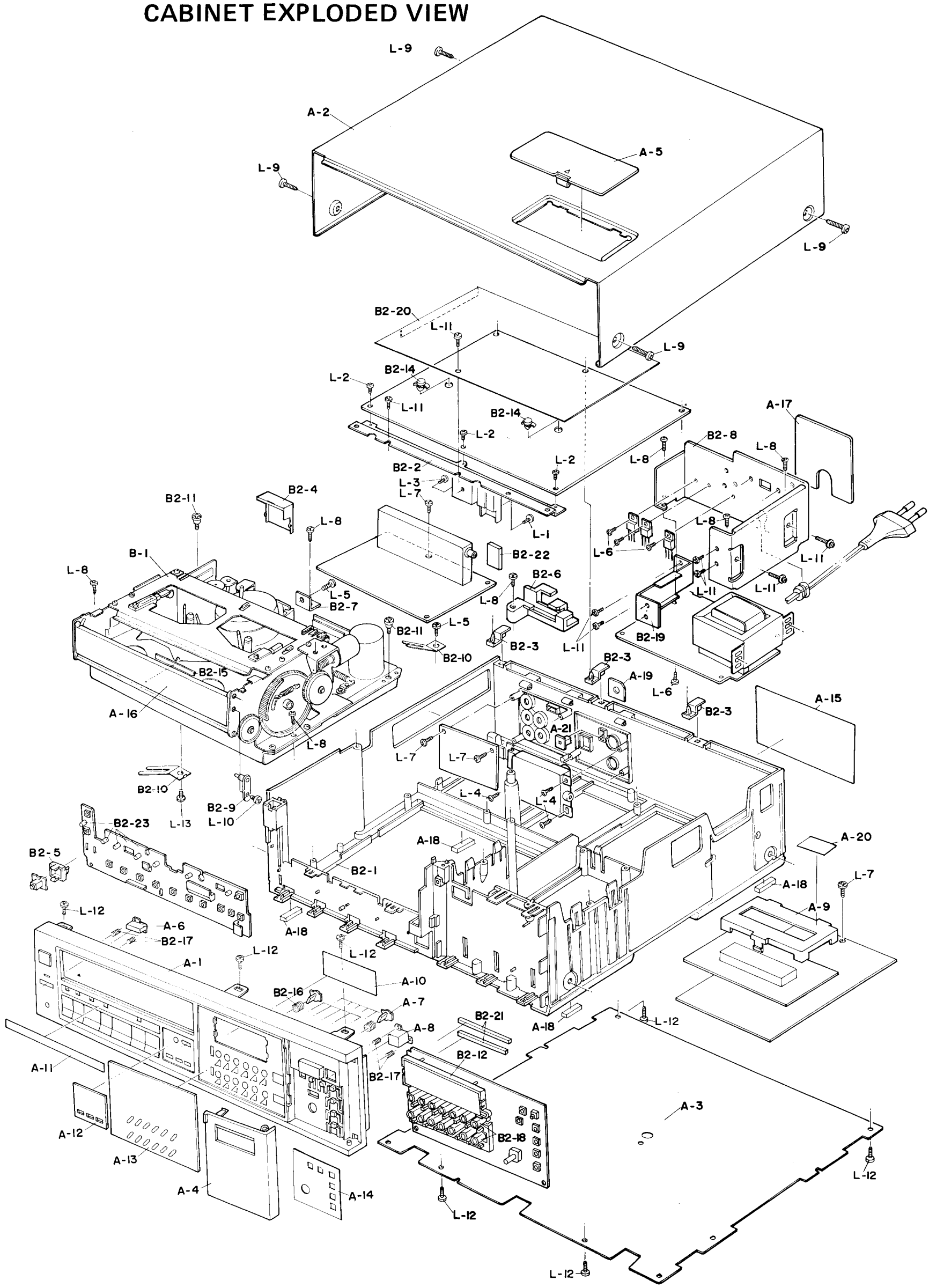

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